FIELD MUSEUM OF NATURAL HISTORY BULLETIN

January 1985

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Field Museum of Natural History Bulletin

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COVER

The scene shown in this month's cover photo by Steven Ashe, assistant curator of Insects, might well be duplicated in the forest preserves of the Chicago area. Ashe's subject, however, was a mule deer in Canada's Jasper National Park.

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Events

A Winter Day Film Series

Films are screened on Saturdays. They are free with Museum admission and tickets are not required.

January 12, Lecture Hall I 2:00 pm

Nanook of the North—64 min.
This is Robert Flaherty's first film, made in 1922. Through masterful attention to detail in photography and editing, Nanook, his wife, and children emerge as recognizable individuals. Scenes of traditional Eskimo culture are juxtaposed with scenes of an encroaching Western culture.

January 19, Hall 18 2:30 pm

Eskimo Artist Kenojuak—19 min.
We see Eskimo life through the eyes of Kenojuak, an Eskimo wife and mother who makes drawings and prints. "Many are the thoughts that rush over me," she says, "like the wings of birds out of darkness." Kenojuak transforms these thoughts into beautiful images which tell us much about the Eskimo's close relationship with nature.

The Owl Who Married a Goose—8 min.
In the solitude of the arctic, a goose captures an owl's fancy. This brief animated film recounts the poignant adventures of this unlikely pair. Based on an Eskimo legend, the story is told using Eskimo voices to accompany beautiful, shadowlike images.

January 19, Hall 18

Eskimo Children—10 min.
Depicts the search for food during the short summer of the Canadian Eskimos. This search is aided by beautifully decorated tools made from bear and seal bones.

January 26, Lecture Hall I 2:00 pm

Eskimo Summer: People of the Seal—52 min.
In 1963-1965, an ethnographic film record was made of a Netsilik family following the traditional migratory route used for centuries by their ancestors. Since that time the Netsilik have abandoned their traditional way of life and moved into a permanent government village.

Eskimo Expeditions

Saturday, January 12 & 26, 3:00-4:00 pm
Stanley Field Hall

Arctic sunlight reflecting off snow is so strong that Eskimos have to be careful of snow blindness. They wear special snow goggles with tiny eye openings to cut down on the light entering the eyes. Make a pair of snow goggles for your own snow-bound expedition.

These features are free with museum admission and no tickets are required.

"Polar Potluck"—a participatory play

Saturday, January 19, 1:00 pm

Hall 18

Your family is cordially invited to a farewell party for Karl and Katy Caribou, who are getting ready to migrate south. Pandora Polar Bear, Samantha Seal, and Walter Walrus are planning a big party to send them on their way. Participate in this play about arctic animals and bid the Caribou Bon Voyage!

This feature is free with museum admission and no tickets are required.

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CONTINUED from p. 3

Events

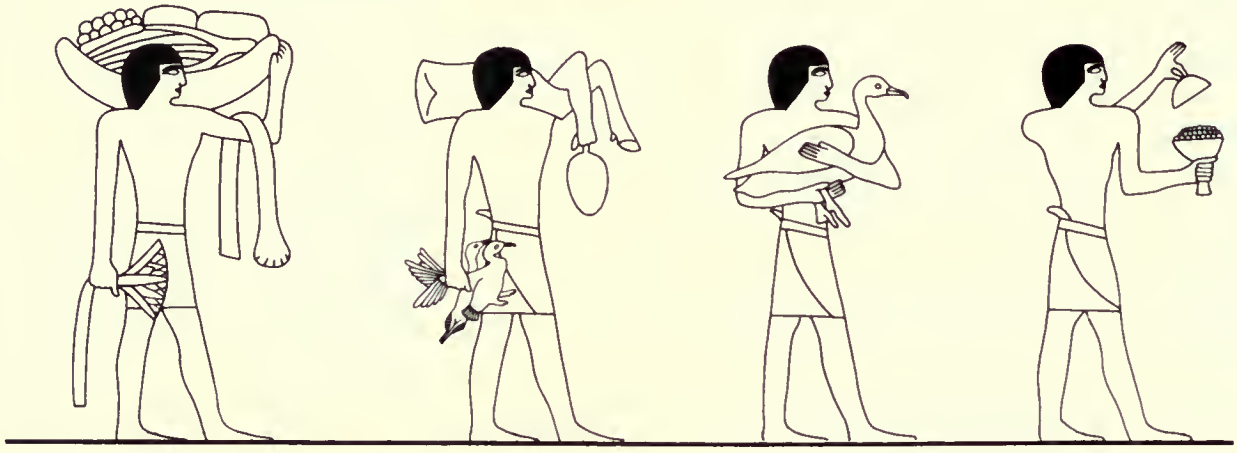
Family Feature

Aztec Calendar Stone

Sunday, January 13, 1:00-3:00 pm

January is the time for New Year's resolutions and new calendars. The Aztecs of Mexico used a round calendar, carved from a single stone; it measured 12 feet across and weighed 57,000 pounds. The calendar was covered with symbols chiseled out of stone that named each day of the month. Find out how to read this ancient calendar. Make an Aztec-style calendar using symbols of your own design.

Family features are free with museum admission and no tickets are required.



January Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

January

5 2:00 pm. *Malvina Hoffman: Portraits in Bronze* (Slide lecture). Find out about the life and works of Malvina Hoffman, concentrating on the Portraits of Mankind collection commissioned by Field Museum.

6 1:00 pm. *Welcome to the Field* (Tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

12 11:30 am. *Ancient Egypt* (Tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

13 12:30 pm. *Fireballs and Shooting Stars: Keys to the Universe* (Tour). Discover the origins, types, sizes and importance of meteorites.

1:00 pm. *Museum Safari* (Tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

1:30 pm. *The Brontosaurus Story* (Tour). Look at some of the newest discoveries about the "thunder lizards" and other large dinosaurs.

19 2:00 pm. *Traditional China* (Tour). Examine the imagery and craftsmanship represented by Chinese masterworks in our permanent collection.

20 1:30 pm. *Red Land/Black Land* (Tour). Focus on the geography of the Nile Valley and its effect on the Egyptians who lived and ruled during 4,000 years of change in religion and cultures.

26 12:30 pm. *Treasures from the Totem Forest* (Tour). A walk through Museum exhibits introduces the Indians of southeast Alaska and British Columbia, and their totem poles and masks.

2:30 pm. *Chinese Ceramic Traditions*. A tour of masterworks in the permanent collection explores 6,000 years of Chinese ceramic art.

27 12:30 pm. *Museum Safari* (Tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

These public programs are free with museum admission and tickets are not required.

View of Pitcairn Island, from engraving published in 1867

Historical Pictures Service, Chicago

Living Together

How rapidly did human numbers increase on Pacific Islands during prehistoric times? How did these people cope with the problems of living together as their numbers increased?

by JOHN E. TERRELL
Curator of Oceanic Archaeology and Ethnology

How can we account for the remarkable diversity of the Pacific Islanders in biology, language, and custom? Europeans and Americans for more than two hundred years have generally found it easy to look at the modern world of the Pacific and see there a number of races of humankind allegedly differing in physical appearance, temperament, achievements, and possibly even in intelligence. Conventional names for these supposed races are by now deeply ingrained in Western thought: Polynesians, Micronesians, Melanesians, Australians, Southeast Asians, and other labels for geographically more restricted groupings of people.

In Prehistory and Human Diversity in the Pacific Islands, *forthcoming from Cambridge University Press, John Terrell argues that simple divisions of humanity such as these do not fit the facts, as we actually know them, of how people in the Pacific vary in biological heritage, traditions, and linguistic conventions. However obvious racial, ethnic, or geographic divisions in the Pacific may seem to us today, dis-*

"Living Together" is adapted from the book Prehistory and Human Diversity in the Pacific Islands, *by John E. Terrell, and appears here courtesy of Cambridge University Press, which will publish the book in 1985.*

tinctions among people such as these add up to little more than a crude, static snapshot of human diversity: a picture that gives us little sense of time and a misleading sense of how variation among the Pacific Islanders came to be.

How should a better picture of human diversity in the Pacific be put together? Prehistory and Human Diversity in the Pacific Islands *is an invitation to a way of thinking about the past and the causal pathways leading to the present that builds on the modern definition of science as a continuous dialogue with Nature (including the world of human artifice) joining human imagination with logical and empirical methods of evaluation.*

The following is an excerpt (somewhat condensed) from the eighth chapter of Terrell's new book. In this chapter, called "Living Together," he discusses the questions of how fast human numbers could have grown on the Pacific Islands in prehistoric times, and how people came to handle the problems of living together as population increased. He turns to the story of a famous mutiny on the high seas and the recorded history of Pitcairn Island in modern times to document the upper limits of how swiftly human populations can grow.—Ed.

The story of the mutiny against Captain William Bligh on board the *Bounty* in April 1789 has been told many times. Bligh had distinguished himself a decade earlier as sailing master on H.M.S. *Resolution* during James Cook's third and last voyage to the Pacific. But fable and history alike say Bligh was a stern disciplinarian, strong-willed and prone to sudden bursts of anger, who was a master of foul, stinging rebuke. He finally paid for his quick temper by being cast adrift, along with eighteen other officers and crew, in the *Bounty*'s launch. Thereafter, he once more proved what an uncommonly fine seaman he was, for he navigated the small boat 5,822 kilometers from Tonga, where the mutiny had taken place, to Timor. In all, twelve of the nineteen men reached England alive.

The mutineers were twenty-five in number. By the end of September 1789 they had divided into two separate parties. Sixteen sought refuge at Tahiti, where the islanders welcomed them warmly. Two years after the mutiny, H.M.S. *Pandora* arrived in the Society Islands to capture and return the mutineers to England to stand trial for their conduct against their commander. By then there were fourteen.

The second party, nine mutineers together with twelve Polynesian women, six men, and an infant girl, went off to Pitcairn, an uninhabited volcanic island roughly 6 square kilometers in area which had been discovered by the explorer Carteret in 1767. There they hid from the world until their colony, by then thirty-five in number, was found by Captain Mayhew Folger of Boston in 1808.

We will never know precisely what happened on Pitcairn between the founding of the colony in 1790 and Folger's arrival. Murder and rebellion had evidently so troubled the community that by 1808 only one mutineer survived, and all six Polynesian men were dead. It would be an understatement to say living together on Pitcairn had been more difficult than life on board the *Bounty*.

The mutiny on the *Bounty* and the early years of settlement on Pitcairn are both celebrated examples of the difficulties of living together, of adapting not to impersonal forces in the environment such as drought or typhoons, but to the needs, demands, and even the physical presence of others. Since we are looking first of all at how fast or how slowly human numbers can grow, it is instructive to observe how much, or more accurately how little, the murderous early years on Pitcairn endangered the *Bounty*'s small colony there.

Some of the conflicts dealt with on Pitcairn in the years immediately following the establishment of the mutineer colony were, of course, more or less unique to that time and place. By the end of 1793, treachery had cut down the number of adult males in the community from fifteen to only four. The reasons behind this early bloodshed apparently involved the shortage of women, highhanded treatment of the Polynesian men by the mutineers, lust for revenge, and possibly poor leadership as well. According to a naval captain who visited the island in 1814, the ringleader of the mutiny and nominal head of the little colony, Fletcher Christian, committed so many acts of wanton oppression after landing, he "very soon incurred the hatred and detestation of his companions

in crime, over whom he practised the same overbearing conduct of which he accused his commander Bligh."

Regardless of Christian's conduct as leader, the other reasons mentioned for the rapid decline in the number of adult males can hardly be generalized to fit other occasions of island colonization in the Pacific. Of broader interest, therefore, is how the survivors after 1793 handled growing human numbers following their self-induced and decidedly bloody ecological crunch — their sudden loss of so many men of reproductive age—at the very beginning of settlement.

In spite of this loss, the colony survived and slowly increased in size. Between 1793 and 1800 there were seventeen births and only one infant death. However, between 1801 and about 1805 — when Thursday October Christian, the first male child born on the island, married Teraura, one of the Tahitian women who had arrived with the mutineers — the only adult male still living was the mutineer known to history both as Alexander Smith and as John Adams (the name Smith preferred). It is worth looking closer at his story, for it shows how custom and human values may influence the biological success of human groups.

Thursday October Christian, son of mutiny leader Fletcher Christian and the first male born on Pitcairn Island.

Historical Pictures Service, Chicago

Bounty *mutineer Alexander Smith, alias John Adams, sought to have Pitcairn Islanders transported to Tasmania or Australia, fearing that the island was in danger of overpopulation.*

According to some biologists today, human beings — and animals in general — seek to maximize their reproductive success. That is, people are purportedly driven by some sort of inner urge or instinct to produce as many children as they can. The case of Alexander Smith, alias John Adams, belies the generality of such thinking. Finding himself the patriarch of Pitcairn after the last other mutineer had died, apparently of asthma, around 1800, he turned to religion rather than to all the remaining Polynesian women. He and his wife Teio produced his last child, a boy, in 1804. That child was the only birth on Pitcairn between 1801 and the latter half of that decade: when Thursday October Christian and his bride (who was twice his age) began to add to the population following their marriage.

When Captain Folger discovered the Pitcairn colonists in 1808, their number comprised the two males we have just spoken of, their wives, seven other adult women who were not then bearing children, and a total of twenty-four children (thirteen males and eleven females, ranging in age from a few weeks to eighteen years). From 1810 onward, marriages among the young adults increased and the number of people on the island grew enormously at the swift rate of about 3.7 percent each year: a rate so high, numbers on Pitcairn were doubling every twenty years.

Fear of overpopulation on Pitcairn troubled John Adams from an early date. In December 1825 he asked Captain F. W. Beechey of the warship H.M.S. *Blossom* for assistance in the possible transportation

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The church on Pitcairn Island. From a mid-nineteenth-century engraving.

of the islanders to Australia or Tasmania. Where and when to take them were discussed by the British Admiralty and the Colonial Office. The islanders, however, were later found to be unwilling to abandon Pitcairn. Thereafter, the British government was uncertain how best to proceed, partly from its reluctance to break up so happy, hospitable, and pious a community in the heathen Pacific.

John Adams's fear of overpopulation did not go unchallenged. An estimate by Captain William Waldegrave of H.M.S. *Seringapatam,* which called at Pitcairn in March 1830, set the island's size as large enough to maintain 1,000 souls. Back in England, this generous estimate was greeted with skepticism. Sir John Barrow, second secretary to the Admiralty, agreed that the island's population was increasing rapidly. He accepted there was a limit to the number of people it could support, just as Malthus had warned in his *Essay on the Principle of Population,* first published in 1798. In fact, Barrow suspected the island's insufficiency to support large numbers might explain why its ancient population had sought asylum elsewhere. Even so, he concluded the Pitcairn Islanders would be safe from any want of food for half a century at least.

These early calculations of Pitcairn's capacity to carry its growing human numbers neglected to allow for ecological crunches now and then: in particular, for shortages of water. Severe drought and crop failure in 1830 finally moved public opinion on the island more in favor of emigration. In 1831 the entire colony was taken on board the Government Bark *Lucy Ann* and removed to Tahiti. There they remained scarcely five months before they went back to Pitcairn. Sickness had so ravaged them while they were away, their numbers were reduced by sixteen deaths through this brief misadventure.

The dangers of overpopulation, water shortage, and crop failure once again became all too apparent by the 1850s. There was another severe drought in 1853. Rosalind Amelia Young, a native of Pitcairn, related in 1894 that the people had been obliged back then to eat whatever they could find, unripe pumpkins forming their principal diet. Not long afterwards

sickness plagued them, as it had on numerous earlier occasions. During the following twelve months, Young tells us, "life gradually assumed its ordinary, monotonous round; but every day was bringing nearer the day when everything was to be changed."

That change was the emigration of the islanders once again, not to Tahiti this time, but to Norfolk Island. On 2 May 1856 the entire population of 193 people was removed on the vessel *Morayshire*. On the 9th of May, there was a birth at sea, a male child, while they were in transit. Young records that the islanders found Norfolk on their arrival to be a land flowing with milk and honey: there were large numbers of strong, healthy cattle and the honey of wild bees was free for the taking from hollow trees. But not all took to their new home. Two families, 16 people in all, went back to Pitcairn in 1858. There they were joined by 26 more in 1863.

The number of people living on Pitcairn grew once again, reaching a high in 1937 of 233. During the present century, numbers have fluctuated significantly because of individual and family emigration—particularly after World War II. Although the total population in 1961 was 126, there were only 19 men under sixty. There were 74 people in 1976. And only 44 in 1982.

The story of increasing human numbers on Pitcairn and the threat there of overpopulation illustrates one problem of living together that must have confronted prehistoric settlers on all but perhaps the largest islands in the Pacific. What happened on Pitcairn, in fact, may tell us about the most extreme rates of population growth that people anywhere have ever had to deal with for very long. In the years between 1810 and the disastrous migration to Tahiti—when the proportion of young adults was high—the average annual rate of increase was 3.9 percent. In comparison, growth rates for the Pacific as a whole since 1800 are thought to have gone from a low of 0.9 percent between 1800 and 1850 to a high of 2.7 percent during the decade 1950-60. The present estimated rate of growth in the Pacific is about 2.0 percent.

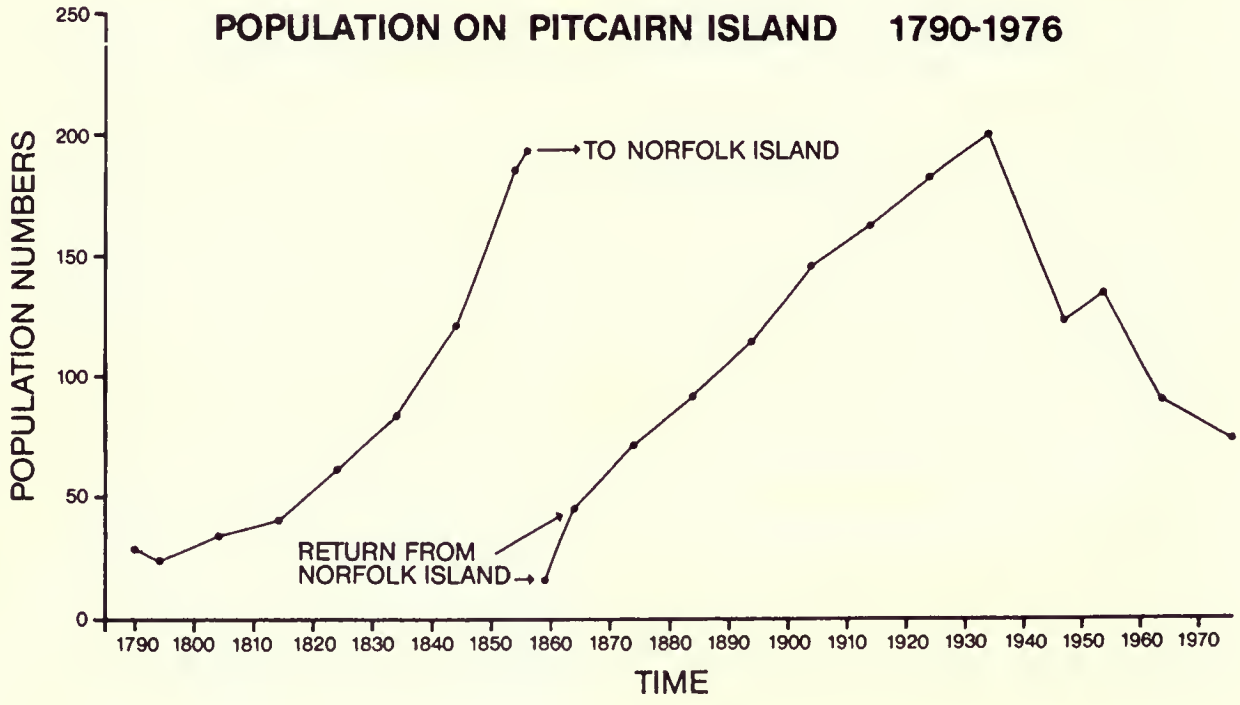
This one example drawn from the early history of modern colonization in the Pacific has helped us establish the upper limits to how fast human numbers could have grown in prehistoric times. Of course the one case of Pitcairn Island does not prove, or even necessarily suggest, that ancient island colonies grew at such astonishingly high rates of increase. Given present knowledge, we can only guess what were the usual prehistoric rates of growth, and any estimates we make must try to take into account differing risks and possibilities from one island or archipelago to another. But knowing what the upper limits of growth are likely to have been should give us a clearer sense—as research on the prehistory of the Pacific continues—of how soon and how pressing the problems of population growth might have affected island life in former times.

In writing about the prehistory of the islanders we will also need to take into account that there is a limit, as well, to the number of ways in which anyone can respond to growing human numbers (if all we are talking about is controlling the natural rate of increase). So it is possible to say at least a little about

Historical Pictures Service, Chicago

Maria Christian, Ellen Quintal, and Sara McCoy—descendants of Bounty *mutineers and residents of Pitcairn Island. From an 1888 engraving.*

how islanders might have tried to cope with the threat of overpopulation. Emigration is one possible mechanism of population control, a mechanism that stands out prominently in the nineteenth-century history of Pitcairn Island. Other mechanisms that could have been used to keep numbers down include birth control, marrying late, infanticide, suicide, and warfare.



What about the reverse of overpopulation? What could people in the Pacific have done to avoid the "death," or extinction, of island colonies? In general it is more difficult for people to maximize births and minimize deaths. The human species is not one that produces a large number of offspring at every birth, and the period of time between human births is usually a year, or two, or even more. Thus, it is difficult for our species to counterbalance high death rates with equally high birth rates. Yet here, too, Pitcairn illustrates one move that people could have made to increase the number of offspring being produced: they could have loosened social constraints on marriage, or at least on sexual intercourse. The marriage on Pitcairn around 1805 between a boy of fourteen or fifteen and a woman twice his age would be an example of a loosening of social constraints, at least by present mores. Alternatively, John Adams's "failure" to wed all the adult women he was left with on Pitcairn after 1800 may be seen, at least superficially, as a case of falling short of maximum reproductive effort.

Talk of "maximum reproductive effort" implies, however, that people may try, consciously or unconsciously, to produce as many babies as they can. We will never be able to know for certain how often people in the Pacific acted as if that was one of their goals in life, biologically speaking. So the best we may someday be able to achieve in telling the story of the islanders will be to determine where and under what circumstances it would have made a real difference to what happened in prehistory if people had, in fact, acted to maximize their colony's rate of population growth.

While we have not looked at all possible facets of how fast human numbers could have grown since settlers had founded a new colony on some uninhabited island, let us assume that biological success as witnessed by growing human numbers was achieved there. How might people have come to handle the problems of living together as population mounted higher and higher?

Continued on p. 19

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Mushroom Mania: Is It for You?

by Martyn J. Dibben

Photos by the author

A decade or two ago the promotional line "mycologists have more fungi" was a rallying call for the professional student. Today, the phrase is more broadly applicable as informed amateurs from all walks of life, interested in the edible qualities of wild mushrooms, have discovered that the fungus among us is not necessarily so evil after all. The Great Lakes region is blessed with an excess of 2,000 fleshy fungi that might be called mushroom, but of these, maybe only 50 to 100 (some 2.5 to 5.0 percent) are potentially edible. When one considers frequency of occurrence, quantity of production, and reliable identification in the field, the average mycophagist (mushroom eater) requires familiarity with only some half-dozen or fewer species unless he becomes an ardent lover of fungi.

The United States is a melting pot of ethnic origins, yet today's generations are woefully ignorant of past practices in the use of wild mushrooms. While European countries maintain the tradition of selling some 30 different species in their local food markets, America has gloried in the mass production of just the white form of *Agaricus bisporus*—a hybrid cousin of the Field Mushroom, or Champion. Cultivation of this fungus began near Paris in the seventeenth century and today France's capital has hundreds of miles of mushroom beds in suburban caves, tunnels, and sheds. But more pounds are consumed each year in the United States than in any European nation, and what was once a cottage industry is today a major commercial enterprise. The largest mushroom operation in the world is the Butler County Mushroom Farm, 30 miles northeast of Pittsburgh. It, and the famed Kennett Square area of Chester County, Pennsylvania, account for half the USA's production. Pickers wearing miners' hats with lamps gather each month's harvest for transport by refrigerated van to canning and produce centers as far away as Milwaukee.

Eating mushrooms was a common practice in Roman times, and dignitaries designated such fare *cibus diorum*, or "food of the gods." Yet, Emperor Claudius Caesar's favorite, *Amanita caesaria*, is a close relative of some of our most deadly fungi. Although slaves were employed to distinguish between different kinds, Claudius was finally dispatched by a plate of mushrooms supplementarily poisoned by his wife, Agrippina, with son Nero's help. Because of similar histories and a plethora of folklore, a goodly portion of today's Americans remain reluctant to eat edible fungi (including the commercial products), although personally they may not be allergic to mushrooms. And where this mycophobia is as strong as the fear of snakes or spiders in others, the concerned individuals resort to needlessly destroying each season's crop of short-lived fruit bodies.

Mushroom lore actually matches a given nation's fear of or fervor for fungi. Mycophobia is as prevalent today among the Greek, Iberian, and Scandinavian cultures as it was among America's earliest colonists, whose unbridled terror of fungi overshadowed the native Indians' use of wild plants. The British, in par-

The Oyster Mushroom, Pleurotus ostreatus, *a choice, shelflike edible found on trunks or stumps of many deciduous trees. Two to eight inches broad, it may be found year-round.*

"Mushroom Mania: Is It for You?" is reprinted from Lore, *with minor emendations, courtesy the Milwaukee Public Museum.*

Martyn Dibben is a surviving mycophagist and head of the Milwaukee Public Museum's Section of Botany. He is a past president of both the Botanical Club of Wisconsin and the Wisconsin Mycological Society. A lichenologist by profession, he works on the Midwest flora, the lichens of Central America, and selected taxa from the tropics and southern hemisphere continents.

ticular, considered nearly all mushrooms poisonous and derisively called them "toadstools," a misleading term that is best dropped in favor of "edible" versus "nonedible" species. Love of fungi is more typical of Far Eastern and Southeast Asian races and those mycophiles of Europe, the French, Italians, Poles, and Russians. These groups are now exerting their influence on the American market; but this is not to say that others are unaware of the virtue of truffles, the elegance of the King Bolete, or the call of spring morels.

Sparked primarily by a renewed interest in natural foods, increasing numbers of "shroom hunters" are taking to the fields and forests. Stalking the wild mushroom has for some become a thriving American sport—mycology is mushrooming. It constitutes the perfect rainy-day activity, with all the thrills of the chase, an open season, far better chance for success than any fishing trip, and more exercise than watching one's favorite athletic event. However, even though armed with a diversity of current field guides and brimming with excitement from a recent extension course, the modern enthusiast may still be courting disaster, for the dangers of mushrooming are atypical in that they follow you back home after the sport. *Identification is the key*, but like all things biological, fungi are subject to variation and the vagaries of look-alikes. There are no shortcuts to determining edible versus poisonous species, and confidence comes only with knowledge built up over the years. A mycophagist must know his mushrooms (as a sportsman his prey) or seek the help of an expert or well-informed comrade.

The Wolf's Milk, or Toothpaste, Slime Mold, Lycogala epidendrum, *widely distributed throughout the world, commonly occurring on large, wet logs. No slime molds are considered edible, but most are beautiful.*

In the USA, professional mycologists traditionally join the Mycological Society of America, which promotes scientific meetings and publishes the technical journal *Mycologia*. But many now also belong to a growing amateur group, NAMA—North American

For the Novice Mushroom-Seeker: A Cautionary Note

The native peoples of northeastern North America did not make extensive use of mushrooms in their diet, but many cultures of Europe have centuries-old traditions of mushroom use. There appears to be an underlying environmental reason for this difference: the poisonous mushrooms of Central Europe are fewer in number and easier to identify than those of eastern North America. (A curious footnote to this phenomenon is the fact that the European form of one species is edible while the North American form of the same species is poisonous!) Unfortunately, many Europeans who have settled in our area have been unaware of the fact that mushroom identification here is much more difficult. Not unexpectedly, many mushroom-poisoning victims have been immigrants from those countries or members of their families.

Mycologists at Field Museum are regularly asked by local hospitals to identify the stomach contents of patients believed to have eaten poisonous fungi (the toxin, hence the treatment, differs for different species). Quick action by physicians and new methods of treatment have greatly reduced mortalities due to mushroom poisoning—but the hazard remains a serious one. It is especially unfortunate that some deadly mushrooms may be very attractive to the palate; an additional problem is that the victim may not realize for several hours (after the toxin has passed from the gastrointestinal tract into the blood stream and vital organs) that he or she is acutely ill.

A final argument against picking wild mushrooms—or any other wild plants for that matter—is an ecological one. Our native forests have been radically contracted by agricultural development, industrial encroachment, road building, and man's continual demand for more living space. If even a small percentage of Chicagoland's seven million residents regularly collect wild mushrooms and plants in the few remaining areas of natural vegetation, we will see a serious decline and the likely extinction of those edible species in our area. Witness the scarcity of the edible morel, or sponge mushroom—now far less common in our area than fifty years ago.—Ed.

The delicious Yellow Morel, Morchella esculenta, *3 to 5 inches tall, is the prize midseason find of the Great Lakes area's several sponge mushrooms.*

Mycological Association, which promotes both mycophagy and the scholarly pursuit of macrofungi and their medical implications. Affiliated with NAMA are some 30-plus regional groups, including the Illinois Mycological Society, which meets at Field Museum on the first Monday of each month. NAMA and its affiliates publish a series of monthly, bimonthly, or quarterly newsletters, which release information on popular mushroom activities across the nation. An irregular journal, *McIlvainea*, contains more lengthy papers, keys, and critical reports on toxicity matters. It commemorates Charles McIlvaine, the father of published accounts on the edibility of North American mushrooms. If you wish to learn more about fungi and are interested in nonedibles as well as gastronomic delights, then the recommendation is to join such a local group.

The False Morel, Gyromitra esculenta, *shown in face and sectioned views, is found only beneath conifers. Best avoided, it has a variable toxicity level for man.*

To the Greek philosophers, mushrooms were created by lightning bolts and rain. Not so bad a guess considering today we know that macrofungus fruiting is effected by a triggered intake of water. Rapid absorption follows, engorging a preformed and frequently substrate-buried miniature version of the mature fruit, transforming it overnight into the fleshy and recognizable carp characteristic for each species. In the Middle Ages such phenomena led toadstools to be relegated to the realm of the occult, and many folktales rose with regard to human diseases created by eating or touching them. Fairy rings were supposedly places where elves danced, toads met, deer rutted, or the devil set his churn at night. And many of these ideas became classic when incorporated into the writings of Chaucer, Shakespeare, and their contemporaries, as seen more recently, when Alice in Wonderland could grow or shrink according to which *Amanita* she nibbled on.

Today we know that mushrooms are nothing more than the exposed spore-producing bodies of a subterranean or host-buried series of elongate fungal cells (hyphae) that mesh together to form an elaborate filamentous mycelium. This absorbs nutrient from within the substrate through which it spreads. From a central point of spore inoculation, the fungal tissue moves out in all directions until restricted by barriers or increased biological competition. When conditions are physiologically correct a ring of fruit bodies is created near the outer border. With time the ring relationship becomes indiscernible unless the habitat is open grassland. In such areas as Kansas's flatlands, Colorado's alpine meadows, or England's Salisbury Plain around the ruins of Stonehenge, mature fairy rings 400 to 650 years old remain, having originated before Columbus's landing in America.

Picking species of *Agaricus, Clitocybe,* and *Marasmius* (the true Fairy Ring Mushroom) is not detrimental to the mycelium so long as overripe and immature specimens are left intact. But overpicking with consequent or deliberate habitat damage is of serious concern. In Europe, seasonal quotas have had to be imposed on certain marketable species for fear of eradication, while in North America the biggest

problems relate to trespass in search of "magic mushrooms" for mind alteration. Hallucinogenic mushrooms have long had religious significance in both Eurasia (the Fly Agaric — *Amanita muscaria*) and Mesoamerica (the psilocybin mushrooms — *Panaeolus*, *Psilocybe*, or *Stropharia*). But today's North American officiants are not shamans, and the experience sought is personal "recreation," thanks to Blue Legs and Liberty Bells. Though the pharmaceutical industry's interest in these fungal groups is valid as a search for tranquilizers, many amateurs who seek relief by means of spotted agarics or ground-dwelling "little brown mushrooms" do not realize the dangers of confusing their targets with similar but deadly *Amanita* or *Galerina* mushrooms.

Although mycologists are botanists, fungi are not plants but nongreen spore-producing organisms and members of their own biological kingdom. Their lack of chlorophyll to absorb sunlight and manufacture their own food via photosynthesis means they must invade already formed organic matter to obtain nourishment. Those that attack dead material are called *saprophytes* and play a major world role as decomposers. Those that attack living material, causing disease and eventually killing it are called *parasites*. While some fungi release enzymes that can be deadly, others play an essential role in baking, brewing, the manufacture of organic acids, the production of medical drugs, and in the dairy industry. Fungi are thus the third planet's most valued converters, enrichers, and synthesizers. Yet, many mushroom mycelia form a symbiotic relationship with roots of their living host. This intimate interaction is known as a mycorrhizal (fungus-root) association, and through it a cyclic transfer of host organic products and fungal minerals occurs. Perhaps sixty percent of macrofungi occur this way and are limited not by substrate specificity but by the occurrence of a specific tree or forest type. And the mycorrhizal role may reach out to a third partner linking that and the tree, as, for example, with the chlorophyll-lacking Indian Pipes.

Understanding the ecology and distribution of mushrooms is a complex matter, for not all species fruit regularly or in the same place. Seasonality may mean yearly or twice yearly for one species, periodically for another, and many years between fruitings for a third. Those woody conks found on tree trunks are perennial, but most fleshy fruit bodies last only a week or two, and mushroom and mycologist may not meet. Obviously those fungi less frequently encountered are the ones we know least about, but we do know that most carps are phenomenal producers of spores. A perennial conk like the Artist's Palette (*Ganoderma applanatum*) or a large specimen of the Giant *Calvatia* Puffball may produce yearly more than five trillion spores. Most eaten gilled or pored mushrooms produce many million to several billion spores. We must be thankful that most spores fail to germinate successfully, otherwise we would be overendowed with fungi rather than the organic debris they so fortunately degenerate.

The hard, pore-surfaced Artist's Conk, Ganoderma applanatum, *grows up to 20 inches wide. This specimen is providing a feast for tiny thrips insects; but the tough, tannin-loaded mushroom is not edible for humans.*

Often highly resistant to drying and freezing, the various-shaped spores of fungi are nearly weightless and easily swept into the atmosphere by air currents. Trapping records detect them floating five or more miles high, and they can travel for hundreds or thousands of miles before settling or being deposited by rain. Not all spores ride the wind, however, those of subterranean fungi (truffles and false truffles) and the stinkhorns requiring animal intervention for dispersal; via ingestion and subsequent broadcast in droppings or by the adherence of gelatinous spore masses to body parts, respectively. Other fungi exhibit unique spore release methods, from the light-triggered firing of spores in the dung fungus, *Pilobolus*,

The Sickener, Russula emetica, *is a delight to the eye but will cause vomiting if eaten.*

through the ballistic firing of spore balls by the Cannon Fungus, *Sphaerobolus stellatus*, to the rain-splashed dispersal of peridioles ("eggs") from within the cups of Bird's Nest Fungi.

Spring is morel season—a special time for mushroom hunters. Yet, more secrecy surrounds the hunting and finding of these fungi than exists for the best fishing holes. Honeycomb, or sponge, mushrooms are a gourmet's delight, and in the Midwest, Boyne City, Michigan currently claims the title of "morel capital of the world," holding an annual National Mushroom Festival each May. The weekend affair may result in visitors collecting more than 20,000 specimens that nationally can fetch up to $8 per pound. The Michigan AAA reported that over a half-million people hunted the state during May of last year. But Chicagoans are as likely to join Wisconsinites in the Spring Green area and travel west to morel fairs at Muscoda and Richland Center.

Fungal diversity reaches its peak in the fall season, and this is when most mushroom societies are likely to hold their fairs and forays. Each year NAMA runs a national foray in a different North American location; 1984's September meeting was outside Toronto. This was the first time since the 1967 inception of the national society that a meeting has been held in Canada. Mushroom fairs have traditionally been run by the older societies of America's east and west coasts. But recently Colorado has become a popular site and developed a complementary series of amateur and professional summer mushroom conferences associated with the nation's central Rocky Mountain Poison Center. Wisconsin initiated in 1984 its first Fall Mushroom Fair, based on a liaison between the Milwaukee Public Museum and the Wisconsin Mycological Society.

For the sake of simplicity, the fungal kingdom may be considered to have four major divisions—only the last two of which form edible mushrooms. *One*, the Myxomycetes, or Slime Molds, whose life cycle includes a stage with animal-like movement of cells; these multiply, aggregate together, and travel as a cellular ooze across substrates engulfing bacteria prior to forming each species' identifiable fruit bodies. *Two*, the Phycomycetes, or Thread Fungi, whose invading mycelia go unnoticed until decay or disease set in and fruiting occurs; included here are the bread molds, water molds, downy mildews, and white rusts that in part were responsible for Ireland's potato crop failure of the 1840s and its subsequent wave of New World emigrants. *Three*, the Ascomycetes, or Sac Fungi, which produce their spores within a case (ascus) from which they are forcibly ejected at maturity; these embrace the powdery mildews (earth's most notorious crop ravagers), the commercially important blue and green molds, yeasts, truffles, and morels, as well as the highly successful alga-fungus symbioses known as lichens. *Four*, the Basidiomycetes, or Club Fungi, that form their spores terminally on short stalks developed from a swollen basidium from which they drop; the agriculturally important rusts and smuts occur here, along with the majority of fleshy fungi whose form can vary from umbrella-shaped to shelflike, cup-shaped to clublike, and ball-shaped to matlike, with spores produced internally or externally on teeth, on flat surfaces with or without convolutions, or lining gills or tubes.

Mushrooms lack the energy content of most food plants, but they are often higher in protein, producing all of the amino acids essential to human growth. They are of course low in calories, a good source of mineral and trace elements (especially iron, copper, and phosphorus), and relatively rich in vitamins C and D and those of the B-complex. Although devoid of vitamin A and low in those essential amino acids found in meat, mushrooms are especially rich in those amino acids lacking in most staple cereal foods. The Glasshouse Crops Institute of England has estimated that whereas fish farming yields about nine times the dry protein per acre of beef farming, mushroom farming can yield around 100 times as much, or approximately 7,000 pounds per acre annually. When one additionally considers the low cost of mycelium sub-

strate, mushroom farming has much going for it.

On a global scale, the White Button Mushroom is still the most commonly cultivated fungus, its laboratory-grown mycelium (spawn) being sown on a mixture of farm litter, hay, and crushed corn cobs. But Asians are as familiar with the Rice Straw, or Paddy, Mushroom (*Volvariella volvacea*) of China and the Black Forest, or Shiitake, Mushroom (*Lentinus edodes*) of Japan, the latter farmed outdoors on hardwood logs. Both of these are now grown as a cottage industry in the United States as well as strains of the Oyster Mushroom (*Pleurotus ostreatus* and relatives), which causes spore allergies among some Europeans, the Velvet Stem, or Enokotake (*Flammulina velutipes*), that in the wild will fruit even under snow; and the Wine Cup (*Stropharia rugosoannulata*).

Other species that warrant attempted domestication or half-culture include the Pine, or Matsutake, Mushroom (*Tricholoma matsutake*); selected chanterelles including the Girolle (*Cantherellus* spp.); the Milk Mushroom (*Lactarius deliciosus*); selected species of False Morels (*Gyromitra* spp.)—although this one is questionable; the Blewit (*Clitocybe nuda*); the porous mushroom (*Boletus edulis*), variously known as Borowiki, Cep, Porcini, or Steinpilz; species of *Craterellus* like the Horn of Plenty and Black Trumpet; the jelly fungus Cloud Ears (*Auricularia* spp.); the Giant Puffball; the Choice Hedgehog, or Sweet Tooth (*Dentinum repandum*); the French truffle and alternatives, and the various morels.

Many of these are already available on supermarket shelves as canned or dried wild collections, but only the truffles and morels currently show promise of commercial success. Cultivated seedlings of appropriate hardwoods impregnated with *Tuber melanosporum* are available in Texas and California, but whether such farming of the Perigord truffle (already successful in France after seven years) in the United States will outshine the Oregon White is not yet known. Developed for marketing, American truffles are more likely to compete with the Italian product and not drastically affect the gourmet price of the French (often more than $350 per pound fresh or $20 dollars an ounce canned). Progress is being eagerly watched by world authority James Trappe and the North American Truffling Society. More difficult is the elusive cultivation of the morel, which until 1981 had defied successful repetitive laboratory fruiting. Ronald Ower's pioneering work in San Francisco has now been repeated by scientists at Michigan State University, and the two have contracted to develop

The Slippery Jack, Suillus luteus, *is one of the many, mostly edible boletes. Found under spruce and pine stands, it grows 2 to 6 inches tall. The cap slime must be removed before eating.*

their still secret process to the point of commercial success. The world is waiting!

One element of folklore that is for real is "foxfire," the colloquial name of the natural bioluminescence exhibited by an assemblage of gilled fungi that invade wood. Most common among mushroom species from the tropics, the responsible photogen "luciferin" produces light ranging in color from blue to green to yellow. Rarely formed in freed spores, it can cause the ground beneath fruit bodies to glow at night. But more often it is the mushroom itself or its aggregated hyphal strands that luminesce. In North America two prevalent examples are (1) the rhizomorphs of

The Hen of the Woods, Grifolia frondosa, *is a choice, late fall edible weighing up to 20 pounds. Often found near oaks or other deciduous trees in mixed woods.*

The poisonous Pigskin Puffball, Scleroderma citrinum, *grows 2 to 4 inches across. Readily identified, on sectioning, by the purple color of its mature spore mass.*

the virulent hardwood parasite *Armillariella mellea* that permeate downed trunks (its fruit body is the edible Honey Cap, or Banana, Mushroom responsible for aborting fructifications of the agaric *Entoloma abortivum*), and (2) the gills of the pumpkin-colored poisonous mushroom *Omphalotus olearius*, which is frequently mistaken for a chanterelle. (Known appropriately as Old Stomachache, or Jack O'Lantern, its tissues have the distinction of turning green on cooking—a character not seen for any edible mushroom.)

Space does not permit a discourse on the structural variances of the more common fleshy fungi, which are best learned in the laboratory or in the field accompanying others who are knowledgeable. But comments on how best to avoid being poisoned are pertinent, since there is no fool-proof way for a novice to separate edible from nonedible species:

Collecting Tips

- Know the deadly poisonous mushrooms of your area (*Amanitas, Galerinas,* certain false morels) and those likely to induce severe illness (some *Clitocybes,* most *Inocybes* and *Entolomas,* selected Inky Caps, also known as *Coprinus*, certain members of the genera *Hebeloma, Lactarius, Russula,* and *Tricholoma*) or hallucinogenic effects (*Gymnopilus, Panaeolus, Psilocybe,* or *Stropharia* spp.).
- Discard belief in folklore. Poisonous mushrooms do not darken onions, potatoes, or silver placed in the cooking pot. Parboiling, drying, or salting removes poisons from only some mushrooms — not all. Poisonous mushrooms do not grow only on wood; they also occur on dung and on the the ground. You cannot be poisoned by touching a dangerous mushroom.
- Do not eat any mushroom whose stalk arises from a fleshy cup buried in the ground or which has a bulbous base. Also avoid any white-capped species with white gills and any "little brown mushrooms" from the woods. This will eliminate many hard-to-identify species, including the deadly *Amanita* and *Galerina* mushrooms.
- When collecting pored boletes avoid those with red pores or that stain blue on bruising, and remove the pored surface prior to cooking. When collecting milk mushrooms (*Lactarius* spp.) do not expect the color of the exuded gill latex to determine edibility. When collecting corals (*Clavaria*-like relatives or *Ramaria* spp.) do not eat those that stain on bruising or taste bitter in the field.
- Do not use wild mushrooms in the button stage nor eat any puffball unless it is pure white inside and of marshmallow consistency. Half-section the puffball to ensure that (1) each is not a stinkhorn or button with outline of cap and stalk, (2) nothing is discolored yellow inside and therefore too old, and (3) the inside is neither hard and white nor purple (*Scleroderma* spp.).
- Pick your own mushrooms and keep only the ones in excellent shape that you can identify. Separate each species within paper or wax bags that can breathe (plastic hastens spoilage). Do not accept others' gatherings at face value nor give wild mushrooms to the novice — you may be liable. Discard insect-riddled or decayed specimens (they may contain waste products or have bacterial invasions) and those gathered from roadside borders (exhaust and herbicide poisoning is possible); discard all unidentified material unless being taken to an expert.
- Do not keep mushrooms in a refrigerator for more than 24 hours without preparing them for preservation. Eat only a small amount of any species being tried for the first time (you may be allergic), and keep reserve material on hand for possible Poison Control Center identification. Do not drink alcohol with any meal made from noncommercial mushrooms (especially Inky Cap, or *Coprinus,* spp.).
- If you are going to become an ardent mycophagist, appreciate that Latin names, a unique parts terminology, and colored spore prints are all part of the game; learn them and how to use them. Buy as many mushroom guides as you can, for no one manual is up-to-date and covers it all. (See list of mushroom books available at the Field Museum Store, page 25.) If possible, join a local mushroom society or seek help from a museum or university expert in finding foray companions. You may indeed find some very worthwhile friends. **FM**

LIVING TOGETHER *con't from p. 10*

Three Ways of Living Together

Before his death on 5 March 1829, John Adams worried about more than overpopulation on Pitcairn. He worried, too, about the education of the young and about who would someday lead what was then, in effect, his one large family. What can we say about the ways in which people there and elsewhere in the Pacific have come to organize their numbers and hand down to younger generations their traditions, learning, and practical discoveries?

Ecologists recognize that living things in general can live together in several different ways. Perhaps the easiest method of coexistence is simply to avoid potential enemies and rivals by living in a different place, or by coming out at a different time of day or night or season than they do, or by having a different way of making a living, a different role in Nature's economy. But what if avoidance is not practical? Logically, at least, there are two alternatives left. When avoidance will not work, then coexistence calls for cooperation or conflict.

If living together is done by working together, the cooperation achieved may be mutually coordinated or unintentional. If living together must, however, bring on conflict, the contest in the natural world may take the form of an open struggle for existence—eating or being eaten, for instance. Or conflict may be more subtle in character; not eat or be eaten, but domination, selfish exploitation, and clever extortion. One example from the natural world would be host-parasite interactions. Such a "parasitic" relationship between people has cropped up repeatedly over the course of history. Consider modern urban racketeers, the Sicilian Mafia, and—according to some scholars—even Bronze Age chieftains in ancient Europe. Living together under such

Historical Pictures Service, Chicago

Mid-nineteenth-century residents of Pitcairn, from contemporary engravings.

unsavory circumstances certainly entails conflicts of interest, if not the human equivalent of eat or be eaten.

These several ways of coexistence—avoidance, cooperation, and conflict—are not mutually exclusive. In fact, avoidance and conflict are both standard methods of living together. Perhaps only cooperation is the more unusual means of getting along with others in the natural world.

What about in the world of human affairs? Has coexistence among people in the Pacific more often than not been a matter of avoidance, conflict, or peaceful cooperation? In recent years there has been much discussion and argument about how effectively people in different parts of the Pacific have created ways of managing social and political conflict, and—more fundamentally—how strongly committed some island societies may have become to living together by conflict and competition rather than by the give-and-take of cooperation.

In particular, it has been accepted anthropological wisdom for the last twenty years or so that domination, extortion, and selfish exploitation of the many by the few are conventional ways by which people holding positions of authority and respect in Melanesia traditionally dealt with their underlings. If you open a book dealing with the anthropology of the Pacific Islanders, chances are good that you will come across one version or another of the following standard portrait of the "typical Melanesian leader." First, unlike their peers of similar or higher rank in Polynesia who are said to inherit their authority, Melanesian leaders are reported to be only "big-men" rather than "chiefs" or "kings"—a label taken from the Melanesian expression *bikpela man*, which means "adult, headman of a village, man of influence and authority, etc." Big-men in Melanesia are said to be merely people who achieve or rise to power by competing fiercely with other neighboring big-men, or aspiring big-men.

Second, the conventional portrait of the typical Melanesian leader also tells us that the competition for power on which his meager authority rests is played out with food and lavish gifts, and not with real weapons of war (not, at least, since peace came to Melanesia as a consequence of foreign domination by Europeans). In short, so the stereotype goes, leaders in Melanesia are merely persons who elevate themselves above the masses by giving their rivals great feasts—presentations so expensive and overwhelming that all contenders are shamed into subordination.

This picture of Melanesian political life as a kind of competitive social climbing has been widely accepted in the scholarly world as true. It has also been blamed for contributing to popular notions about Melanesians as culturally and socially inferior to Polynesians. Epeli Hau'ofa, who is both an anthropologist and a Pacific Islander, has warned us in particular about how damaging this stereotype can be when people see themselves thus categorized, distorted, and misrepresented. "Somehow or other," he says, "we have projected onto Melanesian leaders the caricature of the quintessential Western capitalist: grasping, manipulating, calculating, and without a stitch of morality." How did this distortion, if it is a distortion, come about?

It can be difficult to trace the origins of a stereotype and the caricature of the Melanesian big-man as a thoughtless competitor is no exception. As Hau'ofa comments, however, the anthropological literature on the Pacific—going back for hundreds of years—has often romanticized Polynesians and denigrated Melanesians. And lest we think the claim he makes that Melanesian leaders have been ridiculed as quintessential Western capitalists is a gross exaggeration, here is what one anthropologist, Marshall Sahlins, wrote in 1963 in an article titled "Poor Man, Rich Man, Big Man, Chief: Political Types in Melanesia and Polynesia," a scholarly paper cited and reprinted numerous times since then:

> The Melanesian big-man seems so thoroughly bourgeois, so reminiscent of the free enterprising rugged individual of our own heritage. He combines with an ostensible interest in the general welfare a more profound measure of self-interested cunning and economic calculation. His gaze ... is fixed unswervingly to the main chance. His every public action is designed to make a competitive and invidious comparison with others, to show a standing above the masses that is [the] product of his own personal manufacture.

If what these words tell us is true, then living together in Melanesia, at any rate in the political arena, must be truly competitive and often vicious.

Hau'ofa describes Sahlins's celebrated paper on political types in Melanesia and Polynesia as a "clever, thoughtless and insulting piece of writing," an invidious comparison between—to use Sahlins's own words—the "developed" politics of Polynesia and the "underdeveloped" ways of Melanesia. These are strong words. But are they just?

This last question is worth asking here for two reasons. Looking more closely at how Sahlins has described big-man politics in Melanesia will help us see

more clearly some of the ways people in the Pacific have come to handle the problems of living together. And, as Hau'ofa has remarked, the issue of Melanesian big-men *vs.* Polynesian chiefs has biased not only how foreigners view Pacific Islanders but also how islanders see themselves. If these stereotypes are wrong or just too inaccurate to be useful, then we must look for other ways to describe and model island patterns of diversity in social and political life.

There is no denying that the picture of leadership in Melanesia sketched by Marshall Sahlins in "Poor Man, Rich Man, Big Man,Chief" and in other scholarly papers is a surprisingly simple portrait of human affairs. A big-man, Sahlins tells us, is someone who has had ambition enough to build a personal faction or in-group of loyal followers—initially drawn mostly from his own household and close kinsmen—whose productive energies and resources he can dominate and mobilize to finance public feasts. Why? Because, as previously mentioned, anyone striving to be called *bikpela man* must hold giveaways to shame competitors and thereby elevate one's social standing ever higher and higher. And elevate, too, the standing of one's followers through their close association with an outstanding individual.

When reduced to essentials, such a portrait of politics in Melanesia rests on at least four main assumptions about how people have come to live together in the southwestern Pacific:

1. Some people in the geographic region of the Pacific labeled Melanesia are unusually ambitious, driven to make themselves stand out from the crowd, to raise themselves above the common herd.
2. Any ambitious person who is able to gather a personal following can launch himself on the road to becoming a big-man.
3. People cooperate with an aspiring big-man by contributing their help and resources largely because they are attracted to ambitious personalities by the promise of reflected glory (and they are attracted also by the cunning and manipulative skills allegedly possessed by such ambitious people).
4. Lastly, Melanesia is evidently the kind of place where fame and at least a meager degree of political power can be generated by giving people bigger feasts than anyone else can give one in return; provided, Sahlins adds, the aspiring big-man keeps his gaze fixed unswervingly at the big chance: "towards amassing goods, most often pigs, shell monies and vegetable foods, and distributing them in ways which build a name for cavalier generosity, if not for compassion."

Working from assumptions such as these, Sahlins concludes in "Poor Man, Rich Man, Big Man, Chief" that political accomplishments in Melanesia have suffered habitually from several "fundamental defects," or flaws, in their scale, structure, and performance. And as a consequence, most Melanesian societies have been held back at "rudimentary levels" of evolutionary achievement "in the progress of primitive culture."

What are these failings or flaws in how Melanesians have come to conduct themselves in the political arena? The defects that Sahlins appears to have in mind are said to arise mostly because of the quality or character of the ties believed to link a big-man and his followers together into an organized political force. To be specific, personal loyalities between a big-man and his adherents — who help finance his career as a social climber—have to be carefully constructed and periodically reinforced. And why is that? Because rank and authority in Melanesia—as we have already noted—are supposedly not inherited by right of birth the way they are in Polynesia. And so, "merely to create a faction takes time and effort, and to hold it, still more effort. The potential rupture of personal links in the factional chain is at the heart of two broad evolutionary shortcomings of western Melanesian political orders."

These two shortcomings, Sahlins tells us, are first of all the comparative instability of Melanesian leadership positions, and second, the restrictions that this inherent instability puts on how successfully a big-man can force his followers to increase their economic productivity — a limitation which thereby holds back the development of wider and wider systems of political integration. "Evoking internal contradictions, the Melanesian big-man system thus defeats its own development. It sets a limit on the intensification of political authority, on the intensification of household production by sociopolitical means, and on the diversion of domestic output to the support of wider organization."

The historian Bronwen Douglas has pointed out several weaknesses in the approach that Sahlins and others have taken in their efforts to produce theoretical analyses of traditional systems of leadership in the Pacific. She finds, for instance, that the portraits drawn commonly rely on two stereotypes: "one Polynesian and based on hereditary rank (ascribed status) in a context of social hierarchy; the other Melanesian and based on achieved status in a context of egalitarianism and competition." These stereotypes, she says, have usually been created by studying

only a few island societies in each geographic region and generalizing from those individual cases as if they were somehow typical of all "Polynesians" and all "Melanesians."

Moreover, once such stereotypes have been erected, scholars and laymen alike have tended to force all Pacific societies into one category or the other and to underplay or simply ignore evidence saying the fit cannot be made. In addition, and perhaps most telling of all, because such stereotypes do not convey a clear sense of how social conventions and actual practice are related to each other in particular settings, the resulting portraits of "typical Polynesian society" and "typical Melanesian society" are invariably static and lifeless.

Objections such as these raised by Bronwen Douglas can be leveled against any attempt at model building. The appropriate response to such criticism is not to condemn the efforts they are directed against; instead, the really useful thing to do is see if other kinds of models can be built as alternatives.

It is especially useful to see how alternatives to Sahlins's characterization of the Melanesian big-man might be put together, for the alternative we will focus on here shows how the strategies that people use to get along with each other can look quite different, depending upon which side of things an observer happens to be looking from. With regard to big-man politics in Melanesia, to be specific, the costs and benefits of public feasting and aspiring to high social rank may seem quite different, depending upon whether you are a big-man or a big-man's follower.

Noblesse Oblige

Bronwen Douglas has observed that Sahlins's picture of big-man politics in Melanesia relies heavily—too heavily, she suggests—on Douglas Oliver's description of kinship and leadership among the Siwai (or Siuai) of southern Bougainville. How well does the characterization built by Sahlins fit the Siwai? Is it possible to model Siwai politics in a way that places less weight on conflict, competition, and human ambition as the organizing forces behind social and political cooperation in Melanesia?

Reading the remarkably detailed account of Siwai life and politics given in Douglas Oliver's classic study *A Solomon Island Society* (1955) can leave one with the feeling that some individuals in southern Bougainville strive to become big-men (called *mumi* in Siwai) because of overwhelming personal ambition. But Oliver does not say ambition alone is enough. Reaching the top also apparently takes skill, industriousness, and something the Siwai speak of as *nommai mirahu,* which Oliver translates as "goodness." All of these attributes, Oliver reports, are needed for a man to be successful in becoming a renowned big-man. That leaders in Siwai must be skillful and hard-working, judging from what Sahlins has said, makes sense. But where does "goodness" fit in? That trait of personality hardly sounds in keeping with the self-interested cunning and economic calculation that are allegedly typical features of a big-man's character.

According to Oliver, the Siwai believe high-ranking leaders possess the personal quality of goodness to a very marked degree, just as such outstanding individuals are also thought to have the other attributes mentioned in unusually full measure. A Siwai leader's goodness is held to manifest itself in several ways. As a "generous man," a mumi gives frequently and does not weigh too exactly what he gets back in return. He is "cooperative" in the sense that he really likes to work with others. He is "genial." Specifically, he does not easily get angry and he is usually friendly and responsive. Further, a mumi is "decent" and "trustworthy," especially in how he handles property transactions. A good mumi does not take what is not rightfully his own. He gives in full measure.

Douglas Oliver says that all of these dimensions of "goodness" are interrelated. "A person cannot be deficient in one of these aspects without being deficient in all of them." And their opposites—"selfishness," "uncooperativeness," "immorality," and "uncongeniality"—are heartily disliked.

One possible response to this talk of "goodness" might be to say that the Siwai were only telling Oliver how they wished their leaders would be, rather than how they truly were. It seems certain, however, that leaders in Siwai often lived up to the expectations of those around them. "One has only to listen to the enthusiasm and reverence with which an adherent discusses his leader to realize that the latter constitutes for his neighbors an element of certainty and security which no other role of authority or set of beliefs has adequately provided."

This last remark, in particular, suggests that however much we pay attention to ambition as a personality trait explaining why some men—but not others—seek power and authority in Siwai, we must include the attribute of "goodness" as well when talk-

ing about Siwai political life (and when talking about political life elsewhere in Melanesia, too). Even Sahlins, who has written that a big-man's interest in public welfare is merely "ostensible," has also made the observation that a big-man's dealings help promote society's interests: "In tribes normally segmented into small independent groups, he at least temporarily widens the sphere of economics, politics, and ceremony."

If goodness as well as ambition must be included when modeling Melanesian ways of living together, then several other thoughts should be kept in mind, too. Maybe people who elect to become a would-be leader's loyal supporters are not simply attracted to him by his outstanding personality and by the promise that they will eventually bask in his reflected glory. Or, alternatively, because they are obligated to him by his economic favors (as Sahlins has also inferred). Or, alternatively again, because he happens to be one of their kinsmen and hence tradition tells them they must come to his aid. Maybe, in fact, what Oliver calls the feelings of certainty and security provided by a big-man are not merely comforting but real and substantial.

Reading through what Oliver has written about the Siwai reveals unmistakably that mumi are most decidedly leaders in more than name only. For instance, mumi formerly were the people who organized war parties and conducted raids. Now that times are peaceful, they are still the ones to mobilize friends, relatives, and neighbors for public projects. Similarly, leaders in Siwai serve as arbitrators, judges, sometimes prosecutors, and in general as the people on whom other people can lean during crises, either domestic or civil. Siwai leaders are also the people who are in the best position to exercise considerable influence on affairs beyond their own neighborhoods. "It is not unusual, for example," writes Oliver, "for a high-ranking leader to be requested to arbitrate disputes between leaders of neighboring settlements."

Oliver also reports that leaders in Siwai help create and strengthen social relationships between neighboring communities, the evidence of which can be seen in political alliances, rivalries, commercial relationships, and of course attendance at feasts. "Not only are separate neighborhoods bound closer together in this manner, but social relationships become extended even to neighborhoods in other language areas." And, as Sahlins notes as well, Siwai leaders also function as important instruments of social control. Oliver says that commendation by a mumi is for many Siwai males the sweetest of all rewards; ridicule by a great leader may ultimately result in an offender's suicide in the face of such public humiliation.

If ambition, goodness, and public service are therefore all involved in big-man politics in Siwai (and, by inference, elsewhere in Melanesia, too), then what kind of give-and-take goes on among ambition, goodness, and public service? This seems a question worth asking, for certainly public service in Siwai, as elsewhere in the world, must at times demand putting the common good above personal gain. Perhaps more to the point, what in fact goes into the making of a big-man in Siwai? For instance, Oliver tells us that not all Siwai neighborhoods happen to be lucky enough to have mumi residing in them. Does that not seem peculiar if mumi actually are as helpful, perhaps vital, to the smooth working of Siwai society as it would appear? Do some places lack leaders because people with the requisite amounts of ambition, skill, goodness, and industriousness merely happen to be in scarce supply there? And consequently the presence or absence of a leader of renown in one neighborhood or another is just a matter of luck: some places happen to be blessed with at least one resident able to meet the stiff requirements of high rank but other places, sadly, are not so fortunate?

Answers to these several questions about what goes into the making of a big-man in Siwai may lie in Oliver's remark, mentioned earlier, that Siwai men imagine themselves to be participants in a way of living together that draws all of Siwai (and sometimes more distant neighborhoods) into a social system comprising several "ranks" or "layers." Could it be that people gain positions of higher or lower rank in this hierarchic social world for reasons reaching beyond the fact that they are—to differing degrees—more or less ambitious, more or less skillful, more or less industrious, and more or less good by Siwai standards of goodness? If so, what else might be involved?

In the Right Place at the Right Time

The anthropologist Jay Callen has noted that scholars often answer the question "What goes into the making of a big-man?" in a single-minded fashion. The usual reply given is, as we have seen, that some men achieve the status of big-man because of certain personal qualities they possess in full measure (ambition, magnetism, charisma, cavalier generosity, and the like) and because they successfully cajole a small

core of followers into giving them aid and needed economic resources. But, and this is the important point if what Oliver tells us is actually correct, big-men are also participants in a larger social scene, reportedly having a hierarchic structure, that reaches far and wide....

Big-men and aspiring big-men are part of a political world that reaches beyond their immediate villages, even beyond their local neighborhoods. They participate, in other words, in a political system that displays a spatial as well as a social structure. "It is this spatial patterning of political phenomena," notes Callen, "which suggests that, in Siwai, leaders were as much a function of the central places they inhabited as vice versa. In a certain sense, potential political centers may be said to have 'created' the big-men to occupy them."

We have been considering here two fundamental questions. How fast could human numbers have grown in the Pacific? How well did people learn to handle the problems of living together as population increased?

We have seen that limits of room and nourishment may affect human populations just as they can influence the biological success of other species. Pitcairn Island gave us a chance to examine in historical detail what might have been the upper limits of long-term population growth among the islanders. We saw that the rate of growth on Pitcairn between 1790 and 1856 became so rapid that population there was actually doubling every twenty years. Pitcairn does not prove that island populations in the past grew at such an extraordinary rate. But knowing what the upper limits of growth might possibly have been should help us make clearer sense—as research on the prehistory of the Pacific Islanders continues—of how soon and perhaps how pressing the problems of growing human numbers might have affected island life from one island or archipelago to another in prehistoric times.

We have also seen that living together, in simplest terms, can be accomplished in three ways. We can avoid each other; we can compete with each other; we can cooperate with each other. These three ways of coexistence are not mutually exclusive. In fact, as the Siwai of southern Bougainville have illustrated for us, both competition and cooperation, for instance, are likely to be involved in how people come to align themselves around different leaders and divide up into separate groups as their numbers grow. Where individuals in Siwai have the opportunity to raise themselves above their neighbors is evidently not simply a matter of personality, motivation, and a driving will to compete. If what both Oliver and Callen have told us is correct, then also involved are all the reasons, real or imagined, why people in Siwai want or feel they must place themselves under the leadership of outstanding personalities.

One of the particular lessons we have learned in this discussion is that it is far too elementary to portray big-man politics in Melanesia as personal social-climbing. We must also ask why on earth anyone would put up with having a big-man around. And as Callen's work suggests, the answer to this very human question is likely to be far more complicated than saying simply that followers become followers only to bask in the reflected glory of their leaders and thereby raise themselves, however indirectly, above their more distant neighbors. FM

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

February 1985

"Echoes of Africa"

Performance by the Darlene Blackburn Dance Troupe

Saturday, February 16, 3:00pm

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COVER

Woodblock print by Japanese artist Shunsho Katsukawa (12⅝" × 9½"). The print is the subject of a single volume, published in Tokyo in 1907, showing each of the 127 individual additions of color as well as the composite effect at each of the 127 steps. This number of color additions (many of which required separate blocks) is unusual, but as many as several hundred are known to have been used in creating a single print.

The idea of using woodblock printing to produce low-cost, single-sheet illustrations is usually attributed to Japanese artist Hashikawa Moronobu (1625-1694), who is also regarded as founder of the ukiyo-e school of the woodblock print. Multicolor printing, by means of multiple wood blocks, was first made practical by Suzuki Harunobu (1725-1770).

The huge volume containing Katsukawa's work (21¾" × 14½" × 5¼") was acquired by Berthold Laufer, then associate curator of Asiatic ethnology, during the Mrs. T. B. Blackstone Expedition to the Far East in 1908-1910. The book is now in the Mary W. Runnells Rare Book Room of the Field Museum Library. For more on the Japanese woodblock print see pages 7-22. N109571.

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Events

Echoes of Africa

Darlene Blackburn Dance Troupe
Saturday, Feb. 16, 3:00pm
James Simpson Theatre, West Entrance

From Africa to the West Indies, from the West Indies to America, the Darlene Blackburn Dance Troupe traces the history of African dance movement. Traditional African dances continue to have a profound impact on dance of other cultures. In *Echoes of Africa*, the special relationship of African dance to jazz and American social dance is explored. Selections performed include: *Maiden Dance*, a traditional piece from Cross River State; *Nigeria Hamba*, meaning "to shake the Earth," from the Congo; *The Chase*, a calypso piece from the West Indies; *Raw Soul*, a selection of American social dances; *Jazz Is*, American jazz technique as taught by Katheryn Dunham; *Afrikan*, a synthesis of African, West Indies, and American Dance.
Darlene Blackburn has specialized in African dance as dancer, teacher, choreographer, and producer. Created in 1967, the Darlene Blackburn Dance Troupe has performed to enthusiastic audiences in Ghana, Nigeria, and throughout the Midwest. Ms. Blackburn and her troupe are dedicated to the presentation of African cultural history as a humanistic, creative, and vital influence on the lives of all Americans.

Tickets: $5.00 (Members: $3.00).
Fee are nonrefundable.
Please use coupon on page 4 to order tickets.
Public Programs Information: (312)322-8854

Darlene Blackburn
"Dancer of our time"

Chinese Shadow Puppet Theatre

"Ah Wing Fu and the Golden Dragon"
Sunday, February 24, 2:30pm
Lecture Hall I, First Floor, West Entrance

Shadow Puppet Theatre has been popular in China since the 10th century. Enjoy this ancient art form and attend the premiere performance of *Ah Wing Fu and the Golden Dragon*. The delightful Chinese folk tale tells the story of a man who finds out that the carefree life may not be the best.
This performance is followed by a repeat of a Field Museum favorite, *The Story of Plum Blossom*, which relates the adventures of a brave young girl and her dog.
This program is free with museum admission and no tickets are required.

Family Feature

Birds in the Backyard
Sunday, Feb. 10, 1:00–3:00pm
Bird Hall, Second Floor

Birds that survive the winter in Chicago are truly winged wonders. It can be hard to find food in the snow and frozen ground, but you can help. Using pine cones and peanut butter, make a special bird feeder that no winter resident can resist. A field guide helps you identify all of the different kinds of birds that come to visit you for a tasty winter snack.
Family features are free with museum admission and no tickets are required.

CONTINUED⇨

CONTINUED from p. 3

Events

February Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed are only a few of the numerous activities available each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.
These programs are free with museum admission and no tickets are required.

February

2 11:30 am *Ancient Egypt* (tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

3 12:30 pm *Museum Safari* (tour). Trek through the four corners of the Museum to see the seven continents. See an Egyptian tomb, big game from Africa, and seals from the Arctic.

9 1:30 pm *Ancient Egyptians* (tour). Focus on the lives of the pharaohs and the Egyptian people, from daily life to death and mummification.

10 1:00 pm *Welcome to the Field* (tour). Enjoy a sampling of our significant exhibits as you explore the scope of Field Museum.

16 2:00 pm *Traditional China* (tour). Examine the imagery and craftsmanship represented by Chinese masterworks in our permanent collection.

17 2:00 pm *Treasures From the Totem Forest* (tour). A walk through Museum exhibits introduces the Indians of southeastern Alaska and British Columbia.

23 12:30 pm *Continents Adrift* (Lecture/ Demonstration). Why have fossils of similar dinosaur species been found on continents separated by vast oceans? The concept of "moving" continents is illustrated with enormous puzzle pieces.

24 12:30 pm *Museum Safari* (tour). Trek through the four corners of the Museum to see the seven continents. See an Egyptian tomb, big game from Africa, and seals from the Arctic.
1:30 pm *Red Land/Black Land* (tour). Focus on the geography of the Nile Valley and its effect on the Egyptians who lived and ruled during 4,000 years of change in religion and cultures.

Winter Fun 1985

Children's Workshops

Ages 4-11

Drive away the winter doldrums! Treat your children or grandchildren to weekend workshops at Field Museum during February. Register now! Young people ages 4 to 11 can participate in classes that range from "Volcanoes!" and "The Bear Brigade" to "Dinosaur Debate" and "Pawnee Pow Wow." Anthropologists, zoologists, botanists, geologists, and artists bring their talent and expertise to create new, informative, and creative experiences. See the *Winter Fun* brochure for a complete schedule. If you have not received one, call 322-8854, Monday through Friday, 9:00am–4:00pm for your free copy.

Registration

Please complete coupon for your program selection and any other special events. Complete all requested information on the application and include section number where appropriate. If your request is received less than one week before program, tickets will be held in your name at West Entrance box office until one-half hour before event. Please make checks payable to Field Museum. Tickets will be mailed on receipt of check. Refunds will be made only if program is sold out.

Program Title	Member Tickets #Requested	Nonmember Tickets #Requested	Total Tickets #Requested	Amount Enclosed

Please check appropriate box: Member: ☐ Nonmember: ☐ Total:

American Express/Visa/MasterCard number: _____

Signature _____ Expiration date _____

Name _____

Street _____

City _____ State _____ Zip _____

Telephone Daytime _____ Evening _____

Have you enclosed your self-addressed stamped envelope?

For Office Use:

Date Received _____ **Date Returned** _____

Return complete ticket application with a self-addressed stamped envelope to:

Public Programs: Department of Education
Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605-2497

FIELD BRIEFS

Staff Notes

Harold L. Voris, curator of Amphibians and Reptiles, has been appointed chairman of the Department of Zoology, succeeding Robert K. Johnson, curator of Fishes. Other recent appointments include Stephen Ashe, assistant curator of Insects, who has been named head of the Division of Insects, succeeding John Kethley; and Hymen Marx, curator of Amphibians and Reptiles, who has been named head of the Division of Amphibians and Reptiles. He succeeds Dr. Voris in that post.

Scott Lidgard, who obtained his Ph.D. at Johns Hopkins University, has joined the Department of Geology as assistant curator of fossil invertebrates.

1,500 Guests at Christmas Gala

More than 1,500 children, parents and grandparents attended the "Family Christmas Tea" in Stanley Field Hall on December 13. Sponsored by the Women's Board of Field Museum, the traditional gathering continues to be a very popular holiday activity among Chicagoans.

Last December, partygoers enjoyed tea party fare amid beautiful decorations; listened to holiday music by the Stu Hirsh Orchestra; and were entertained by the Westminster Bellringers of the Village Presbyterian Church of Northbrook, Music and Dance from On Stage Chicago School for the Performing Arts, the Junior League "Mad Hatters," and Bozo the Clown and Cooky the Clown. Ronald McDonald, costumed storybook characters from the Chicago Public Library, the Field Museum dinosaur and, of course, Santa Claus were on hand to greet the many young visitors.

The Women's Board Christmas Tea Committee, co-chaired by Mrs. Stanton R. Cook and Mrs. Robert Lane Cruikshank, is extremely grateful to many individuals, organizations, and corporations whose talents, time, contributions, and services made the occasion so special:

Anonymous Angels
Arthur Andersen & Co.
The Bureau of Art, Chicago Board of Education, and all the creative Chicago Public School children who designed ornaments for our children's Christmas tree
The Chicago National League Ball Club, Inc.
Chicago Park District
Chicago Public Library
The Chicago White Sox
Ferrée Florsheim Catering Ltd.
Field Museum Staff
Helene Curtis Industries, Inc.
Illinois Tool Works
The Kitchens of Sara Lee
Marshall Field's
McAdams Florist of Lake Forest
McDonald's—Ernie Cochanis
Mrs. Arthur C. Nielsen
My II Pizzeria
Salerno-Megowen Biscuit Company
Santa Claus
Sweetheart Products Group
WGN Continental Broadcasting Company
Warehouse Club, Inc. Niles, Illinois
The Women's Board cookie bakers and all our generous Women's Board Members
All the hostesses and young volunteers.

Cameroon Art Exhibit Opens March 9

About 120 art objects from Cameroon, on the coast of west-central Africa, will be on view in the special exhibit area, third floor (formerly designated second floor), from March 9 through June 16. The Members' preview is set for Friday, March 8.

Sponsored by S.I.T.E.S. (Smithsonian Institution Traveling Exhibition Service), "The Art of Cameroon" consists of pieces selected from U.S., European, and Cameroon collections. Included are prehistoric terracotta sculptures, objects in different media of ritual and secular use, and a large number of masks, figural sculptures, and other object types.

Concurrent with the object exhibition will be a photographic exhibition (also from S.I.T.E.S.) which will relate topically and visually to the objects while constituting an exhibition component in its own right.

The exhibit catalog, *The Art of Cameroon*, published by S.I.T.E.S., is now available at the Museum Store. ($15.00, 10% discount for Members). The 8¼ × 12 paperbound catalog was written by Tamara Northern, curator of ethnographic art, Hood Museum of Art, Dartmouth College, and is richly embellished with color photography.

Kennicott Club Meets

The February meeting of the Kennicott Club, a natural history society named for Chicago's first naturalist, Robert Kennicott, will be held at Lincoln Park Conservatory on Friday, February 22, at 7:30pm.

Following dinner at R.J. Grunt's Restaurant (6:00pm), the group will rejoin nearby at the conservatory (7:30pm), where Leonard Gayten, the conservatory's floriculture foreman, will provide a tour. The azalea and camellia show will then be running.

The following month's meeting will be held on Monday, March 4, at Field Museum. The speaker at that time, following dinner at the Berghoff Restaurant, will be Dr. Stephen Ashe, assistant curator and head, Division of Insects. His topic will be "Relationships and Evolution of Mushroom Feeding among Staphylinid Beetles."

Any persons with an interest in natural history are invited to attend the Kennicott Club meetings. For further information, please call or write John Clay Bruner, Kennicott Club vice president (Department of Geology), at Field Museum, 922-9410.

NOW AVAILABLE AT THE FIELD MUSEUM STORE:

"Chicago Area Birds"

by Steven Mlodinow

and sponsored by the Chicago Audubon Society

Published by Chicago Review Press

220 pages, $9.95

(10% discount for Members)

Just off the press! This comprehensive study provides an account of the relative abundance and seasonal and geographic distribution of the 413 bird species that have been reported at least once in the Chicago area (19 counties in four states). Included are maps of dozens of the primary birding areas. No birdwatcher, casual or dedicated, should be without this handy, attractive guide.

TOURS FOR MEMBERS

Ecuador and The Galapagos Islands

May 27-June 11

The Galapagos Islands affect our imagination like no other place on earth. To set foot on these remote islands is to return to a primeval land isolated and protected for millions of years. A distance of 600 miles off the coast of Ecuador are these lost specks of volcanic land on which nature evolved a separate microcosm of animals and plants.

Our tour will begin with a visit in the host country of Ecuador, which offers an opportunity to enjoy the charm of Old World ambience, along with the color and distinction of the centuries-old Indian market villages of Lactacunga and Ambato.

To enhance your learning experience on this tour, Dr. Glen E. Woolfenden, research associate at Field Museum, and professor of zoology at University of South Florida, will be our leader and will accompany the group from Miami and return.

This is our exciting itinerary:

May 27: Fly from Chicago O'Hare airport to Quito via Miami.

May 28: Tour the city of Quito, visit the fabulous Archeological Museum, view the church of San Augustin and Museum of Colonial Art.

May 29: Visit the art galleries of the painters Guayasamin and Viteri; tour the Olga Fish Folklore Gallery. In the afternoon visit the Equatorial Monument. Also, visit the Indian villages of Pomasqui and San Antonio and the crater of Pululahua.

May 30: Full-day excursion over the Andes' western ridge, down into the coastal jungles with their banana, cocoa, and coffee plantations and see the village of the Colorado Indians, colorful in dress and custom.

May 31: Full day of birding in the area of Papallacta. Ecuador is home to more than 1,400 species of birds.

June 1: Morning departure by bus to the Latacunga-Ambato Valley stopping at Latacunga Indian market and the Cotopaxi volcano, where we will visit a small museum at the base of the volcano, and on to Ambato with its huge market.

June 2: Leave the frosty Andean heights, travel across a fertile plain and past highland villages, via Riobamba and Devil's Nose pass to Guayaquil, Ecuador's chief port, where we'll stay overnight.

June 3: A morning flight to Baltra, where we will board the MV *Santa Cruz*. Comfort is indeed the keynote for our life aboard ship in both clothes and atmosphere, with casual attire recommended. Tonight and each evening during the cruise we have a slide presentation and a lecture outlining the next day's highlights.

June 4: The first island we see is Bartolome, site of Pinnacle Rock, the most widely recognized landmark in the Galapagos. Later we cruise in Darwin Bay. Tower island is considered one of the most complete bird islands, with virtually millions of sea and land birds resident to its shores.

June 5: Cruising Isabela and Fernandina Islands, entering Tagus Cover in the morning.

June 6: Cruising Baltra and North Seymour Islands. After a brief stopover at Baltra, we cruise to North Seymour and will be transported to the rocky shore via small craft. Our first encounter, as we walk on the island, is with dense colonies of blue-footed boobies.

June 7: Cruising Hood and Floreana Islands. We follow the marked trails on Hood Island to search for its own species of mockingbird and its most spectacular part-time resident, the waved albatross. Along the way, we catch glimpses of masked boobies and several species of finch. We land at Punta Cormorant on Floreana Island and on an inland lagoon we'll see where multitudes of flamingos nest. Floreana's vegetation is particularly interesting.

June 8: Cruising Santa Cruz and Plaza Islands. Upon arrival at the village of Puerto Ayora on Santa Cruz we walk directly to the Darwin Research Station for a briefing. This afternoon, we call at tiny Plaza Island, where sea lions swim out to welcome us.

June 9: We land early in the morning on a beach of black lava sand on James Island, then hike to a tranquil crater lake where flamingos feed. Next we can swim with (or just observe) the fur seals in one of the pools cut into the cliffs by surf erosion. After lunch we cruise past unusual cinder cones and lava formations along the coast en route to Buccaneer Cove, the former refuge of pirate ships.

June 10: This morning we cruise to Baltra, disembarking in time to board our flight to Guayaquil. En route to the Oro Verde Hotel we will tour Guayaquil, seeing the Avenida Olmedo, city watchtower, government buildings, and the municipal museum. In the evening we'll enjoy a gala farewell dinner.

June 11: Return to Chicago via Miami. Early evening arrival at O'Hare.

Price per person (double occupancy): $3,545 for main deck cabins. Upgrade to upper deck: $150; upgrade to boat deck: $310. An extension to Peru is optional. The tour price includes land and cruise costs and round-trip economy air fare. The tour is limited to 25 people, and early reservations are recommended. A $500 deposit per person should be sent to Field Museum Tours.

Alaska and The Pribilof Islands

June 5-19

June 5: Fly from Chicago's O'Hare to Sitka. Welcome dinner.

June 6: City tour of Sitka. Marine wildlife motor raft trip with dinner on board cruise vessel.

June 7: Late morning flight to Juneau. Mendenhall River raft trip with lunch on board. Evening outdoor salmon bake.

June 8: Morning flight to Glacier Bay. Glacier Bay cruise aboard the MV *Glacier Bay Explorer*. Overnight on board ship.

June 9: After completing Galcier Bay cruise, afternoon flight to Fairbanks via Juneau.

June 10: Ride the Alaska Railroad to Denali National Park. Afternoon at leisure; salmon bake dinner and overnight at McKinley Chalets.

June 11: Full day tour to Kantisna. Return to McKinley Chalets for dinner and overnight.

June 12: Morning at leisure. Afternoon motorcoach trip to Anchorage.

June 13: Morning at leisure. Afternoon tour to Potter's Marsh Bird Refuge.

June 14: Morning at leisure. Afternoon Float Trip on Eagle River with dinner on board.

June 15: Flight to St. George Island.

June 16-17: Two full days exploring St. George Island.

June 18: Return flight to Anchorage. Farewell dinner.

June 19: After breakfast transfer to airport for return flight to Chicago.

Our leader will be Dr. John W. Fitzpatrick, associate curator and head of the Division of Birds at the Field Museum, where he also serves as curator-in-charge of Scientific Services and chairman of the Science Advisory Council. He is an experienced tour lecturer, most recently leading Field Museum tours to Ecuador and the Galapagos Islands, and to the Lesser Antilles.

Tour price: $4,625.00, based on double occupancy (includes round trip coach class air fare). We hope you can join us for this exceptional tour. A deposit of $500.00 per person will confirm your reservation.

Additional Tours for 1985

Colonial South Yacht Cruise
April 13-20

Grand Canyon Rafting Trip
May 24-June 2

China and Tibet
August 10-September 1

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

The Japanese Woodblock Print

An Art Form Unique in Its Subtlety, Grace and Power

by David M. Walsten

"An Eagle on a Cliff near a Kiri Tree" (c. 1716), 22" × 11¼", by Torii Kiyomasu (fl. 1690s-c.1720), possibly a brother of Torii Kiyonobu, founder of the Torii school of ukiyo-e. *Kiyomasu is known chiefly for his depictions of women and actors; he frequently used landscape settings and also painted birds of prey. All his work was done in black and white, with color sometimes added, as here, by hand. Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.*

Long before Toyotas and Datsuns were sending Detroit auto makers back to their drawing boards, a different kind of Japanese import, the woodblock print, was making historic inroads into the Western art world. In the latter 1800s, artists as individual in their vision and technique as Toulouse-Lautrec, Whistler, and Beardsley acknowledged their indebtedness to Japanese printmakers for new ways of looking at and interpreting the world about them.

The assertiveness of their compositions, sharply defined forms, pleasing decorative patterns, and subtle coloration found appreciative viewers among Western critics and art collectors as well. The

The author wishes to gratefully acknowledge the advice and counsel of Jeanine Coupe Ryding and Osamu Ueda in the preparation of this material. Mrs. Ryding is lecturer in the Studio Arts Center of Barat College, Lake Forest, Il, and is an instructor in Field Museum's Courses for Adults program. Mr. Ueda is keeper of the Clarence Buckingham Collection of Japanese Prints, Art Institute of Chicago. Mr. Ueda also kindly provided the translation for the text in the center panel of "The Port of London, England," by Yoshitora, appearing on page 20. The author, however, assumes full responsibility for the accuracy of this article and for judgements rendered.

"A Courtesan Walking" (c. 1715), 21⅛" × 11½", by Okamura Masanobu (1686-1764). Masanobu is credited with a number of innovations in woodblock print technology, notably development of the two-color process and the pillar print, or hashira-e, *which was made long and narrow so that it could fit on a house pillar. He was among those responsible for the introduction of perspective and one of the earliest to use metallic dust. The print shown here was hand-colored. Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.*

"The Sugoroku Players" (c. 1750), 11⅜" × 5½", by Torii Kiyohiro (fl. 1750s-1760), a member of the Torii school. Particularly scarce, his prints were most often of women; he also did theatrical subjects. Nearly all were benizuri-e *—prints done mainly in pink, often together with green. The Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.*

"Catching Fireflies" (c. 1767), 8" × 10¾", by Suzuki Harunobu (1725-1770), one of the most original as well as most prolific of the ukiyo-e *artists. Harunobu's chief contribution was the* nishiki-e, *or polychrome print, made from multiple wood blocks. Though others had used the technique before him, he developed it into a process that was both practical and effective, using as many as ten blocks for separate colors. The Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.*

"Herons and Boat in Snow" (c. 1766), 10⅞" × 8⅛", by Suzuki Harunobu, was done shortly after he began using multiple colors. Though not striking for its use of color, note embossing (in the birds and snow), a technique introduced 30 years earlier by Yoshida Gyosen. The Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.

"Fuji with Lightning" (c. 1831), 9¾" × 14¾", by Katsushika Hokusai (1760-1849). Among Western art critics and art lovers, Hokusai probably stands in higher esteem than any other Japanese artist. This scene is one of 46 comprising the landscape series "The Thirty-Six Views of Fuji," the actual number of views notwithstanding. The series includes those prints generally regarded as Hokusai's finest. Kate S. Buckingham Collection. © The Art Institute of Chicago. All rights reserved.

mounting enthusiasm culminated in an 1890 exhibition in Paris in which more than 1,000 privately owned prints were displayed.

Although this art form had been popular in Japan since the 1600s, the rest of the world knew little of it until trade relations between Japan and Western nations were first formalized in 1854. Then, precisely because it *was* a print—a replication—the woodblock print came to be the principal medium through which Westerners were able to visualize the appearance and lifestyle of these mysterious Asians. Thousands of copies of a single work of art, transferred by the engraver's knife to blocks of wood, then printed on inexpensive sheets of paper, could be sold (for a few sen) and disseminated in a very short period of time.

While the effect of these prints on the European art community was a significant one, Japanese artists, at the same time, came under influence from the West. They introduced harsh aniline dyes, replacing in some measure the vegetable dyes with which they had achieved such marvelous, subtle effects. They also made pitiable attempts to make use of European themes and stylistic devices, forsaking their own. Meanwhile, an increasing demand for prints at

¢"Geisha and Attendant in the Night Rain" (c. 1798), 15⅛" × 10⅛", by Kitagawa Utamaro (1753-1806). Especially noted for his erotic views of beautiful women, sensitive use of color, and design sense, Utamaro's work was featured long after his death in an exhibition in Paris in 1889. Edmond de Goncourt came away from the exhibition so inspired by Utamaro's genius that he wrote a biography of the artist; as a result, Utamaro gained a posthumous reputation in the West that was unmatched by any of his fellow Japanese; Mary Cassatt and Edouard Manet were among his most enthusiastic admirers. Within his own lifetime, however, Utamaro's work was widely appreciated in Japan and had been exported by the Chinese and also by the Dutch, privileged at that early time to have a trading post at Nagasaki. Note the poor register in this print, which increases toward the left side. This effect was caused by swelling of the wood block which had gradually absorbed moisture with each successive impression. Gift of Gaylord Donnelley. © The Art Institute of Chicago. All rights reserved.

"Climbing Mount Fuji" (c. 1831-33), 9⅝" × 14¹¹⁄₁₆," by Katsushika Hokusai, from the series "The Thirty-Six Views of Fuji." Following this initial series, Hokusai continued to do landscapes with Fuji as a motif. More often than not, the mountain's distinctive profile was merely peripheral—even remote—to his central theme. The Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.

home and abroad resulted in the mass production of inferior work; the golden age of the Japanese print had passed.

This golden age was, in fact, a two-hundred-year span known formally as the period of *ukiyo-e*—rather felicitously translated as "pictures from the floating world"—woodblock prints produced from about 1680 to about 1880. Although the translation variously suggests romance, indolence, poetry (the suffix *e* meaning simply "picture"), its Buddhist derivation is somewhat somber, referring to the ephemeral nature of the material world as opposed to the spiritual realities of Buddhism. In time, the term was applied to the heady pleasures of the Yoshiwara—Tokyo's red light district—and its participants: notably prostitutes and kabuki actors; the former, who enjoyed an elevated status that was never accorded their Western counterparts, set standards for physical beauty, elegance, and chic. And these were to be the subjects of *ukiyo-e*; landscapes and travel scenes also came into vogue, as did natural history subjects: flowers, birds, fish, lugubrious insects—all rendered with a grace and subtlety that is unmatched in the art of any other culture.

The common denominator of the seemingly eclectic *ukiyo-e* was the availability of these experiences, sights, and objects in the daily life of the average Japanese. *Ukiyo-e* was, in a word, art for the common man.

The fifteen prints reproduced here are primarily of the *ukiyo-e* period. The journalistic triptychs on pages 19 and 20, though executed in the 1860s, prefigure its end, while Saito Kiyoshi's "Nostalgia, Boston" (1956) belongs to another era altogether. These several works, done by ten artists, provide views of developmental stages in this unique art form over a 250-year period.

Torii Kiyomasu, whose principal work was done between the late 1690s and the early 1720s, did all of his work in black and white, a type of print known

as *sumizuri-e*, though color was sometimes added later by hand. This supplementary color was most often a shade of vermilion (which was highly variable, ranging from orange to dark red); prints done with this color additive are known as *tan-e*, or "vermilion prints."

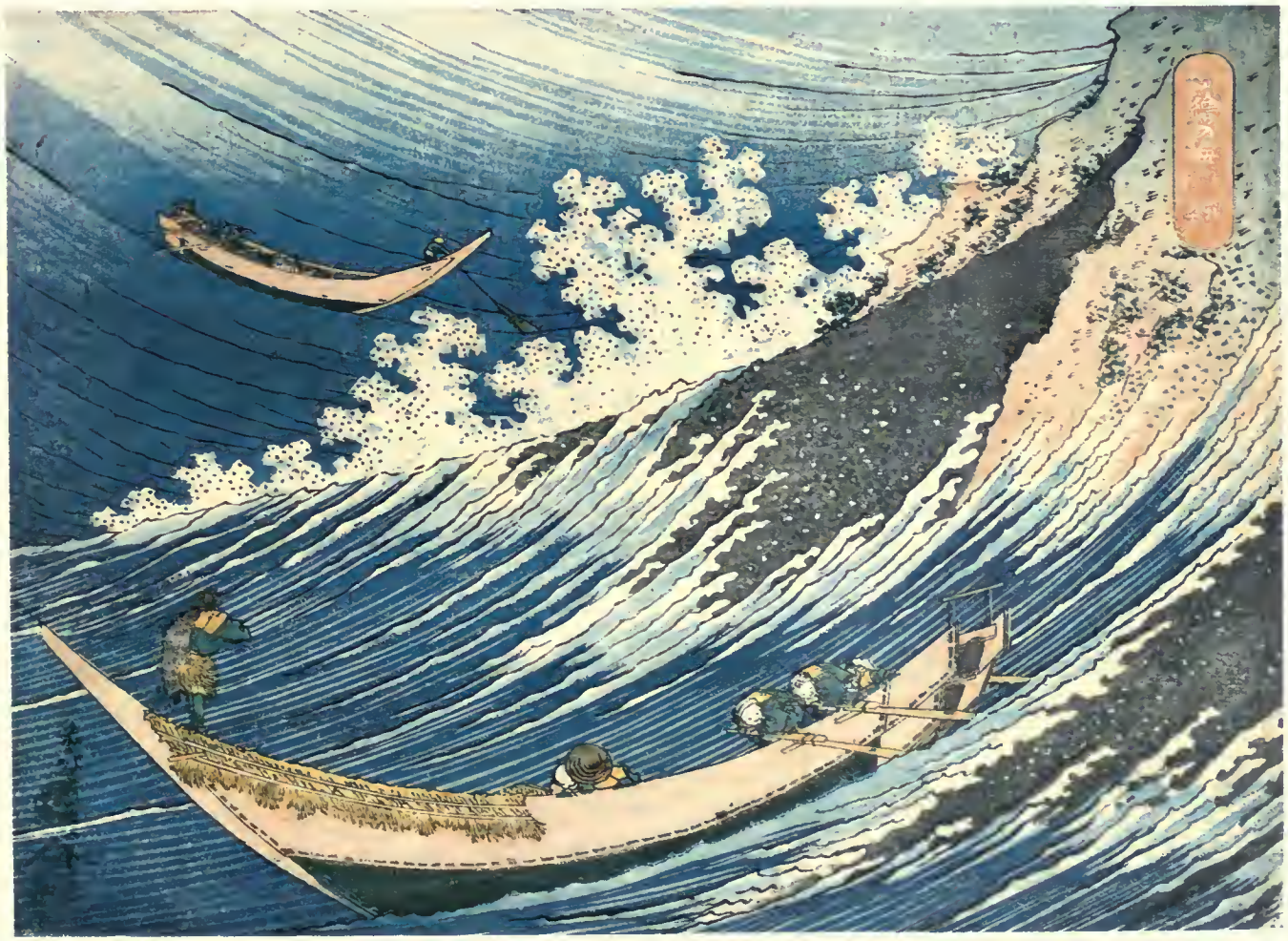
As a painter, Kiyomasu did posters for theatres, and as an engraver he did prints of actors, women, landscapes, and birds of prey. His work is often confused with that of his contemporary Torii Kiyonobu (1664-1729), founder of the Torii school. Especially noted for his careful draftmanship and exquisite design, Kiyomasu's most distinguished single work is thought to be a study of the actor Kanto Koroku, now in the collection of the Art Institute of Chicago.

Kitao Masanobu (1761-1816), the most outstanding member of the Kitao school, enjoyed a highly successful career as an artist, abandoning it however at the early age of 24 to become a writer. As a novelist, under the name Santo Kyoden, he achieved even greater distinction.

Masanobu's most distinguished prints are elegant studies of Yoshiwara courtesans, and some of his work so closely resembles that of his mentor, Kitao Shigemasa, that the two are virtually indistinguishable from one another. Seven diptychs (two-panel prints) done for the book *Celebrated Women of the Tea Houses and Their Handwritings* is perhaps his best known work. Since his career as an artist was so brief, Masanobu's prints are quite scarce.

Torii Kiyohiro, whose life dates are not known with certainty, was most active from about 1737 to 1768. Like most members of the Torii school, he tended to specialize in theatre posters and programs

"Fishing Boats at Choshi in Soshu" (c. 1833), by Katsushika Hokusai. This work appeared during the most fruitful decade of Hokusai's long, productive career. Kate S. Buckingham Collection. © The Art Institute of Chicago. All rights reserved.



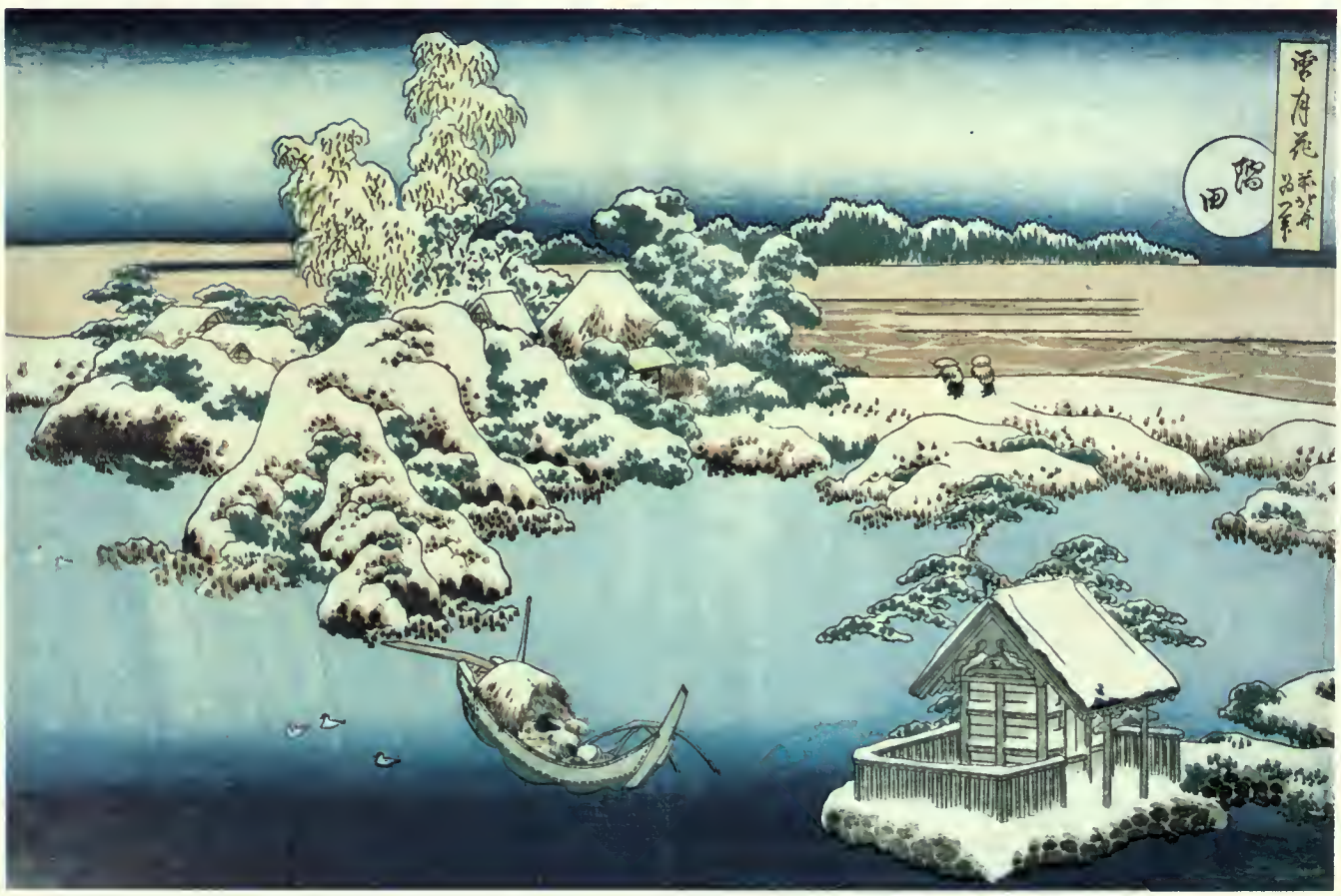
and in portraits of kabuki actors. He was the last artist of distinction to do prints in two colors, rose and green—prints known as *benizuri-e*—before the introduction of the polychrome technique in 1765. His work is today relatively scarce. The Torii school has survived to the present and there is still a member active today—Torii IX.

Suzuki Harunobu (1725?-1770), one of the stellar figures in the history of the Japanese print, is also credited with introduction of the polychrome wood engraving. The first of these so-called "brocade pictures," or *nishiki-e*, were produced about 1765, just a few years before his death. Although earlier artists had used the multi-block process to provide a range of color, Harunobu, whose print-making was funded by wealthy patrons, had the resources to perfect this technique and bring it to fruition; it was Harunobu's work which revolutionized print-making and stimulated others to follow.

Harunobu used as many as ten wood blocks for the polychrome effect; but in the decades to follow, as techniques were further refined and a greater range of pigments became available, the number of blocks was greatly increased. The print by Shunsho Katsukawa, appearing on the cover of this issue, was done (1907) with 127 separate additions of color; some woodblock prints have been done with as many as several hundred.

The quality of Harunobu's work during his entire productive period is remarkable for its uniformity, with only a slight falling-off in his last years. He is especially noted for his charming portrayals of average, middle-class girls, and customarily depicted them in groups of two or three as they went about their daily routine.

Kitagawa Utamaro (1753-1806) was the most accomplished of all Japanese artists in the depiction of lovely women. Though some Utamaro prints reached Europe by way of the Dutch trading post at



"Snow on the Sumida River" (c. 1834), by Katsushika Hokusai, is one of Hokusai's countless evocations of the rural scene — brooding, peaceful, yet charged with a certain tension. Gift of Gaylord Donnelley.
© The Art Institute of Chicago. All rights reserved.

"Ayu Fish" (late 1830s), 14⅝" × 10" by Utagawa Hiroshige (1797-1858). This is a later edition of a print originally published c. 1832. During the period 1811 to 1830, Hiroshige followed his elders in choosing the theatre, women, and samurai for subject matter; then, breaking from tradition, he began doing landscapes, studies of birds, flowers, and fish, during his so-called landscape period (1830 to about 1834)—the time of his best work. Restricted gift of Mrs. Kenneth Bro. © The Art Institute of Chicago. All rights reserved.

Nagasaki in the 1790s, he did not acquire a following in the West until almost a century later; Mary Cassatt and Edouard Manet were among those who expressed enthusiasm for his work.

Early in his career, Utamaro specialized in prints of kabuki actors—work which gave little hint of the heights he was someday to achieve in his protrayals of women of the Yoshiwara. The courtesans are shown in their various moods and daily activities, including explicitly erotic scenes with customers. In technical quality alone, the best of Utamaro's first editions are perhaps unmatched anywhere in the history of the wood engraving.

Katsushika Hokusai (1760-1849). Seventy years ago Arthur Davison Ficke, the British authority on Japanese prints, wrote "Until rather recently Hokusai was, for European spectators, as isolated and commanding a figure in . . . Japanese art as Fuji is in the Japanese landscape." Fiske's observation is close to an accurate assessment of Hokusai's reputation today, and it may be that in the discipline of the landscape this extraordinary artist stands alone.

Hokusai was apprenticed to an engraver when he was still a small child and at 18 he became employed in the studio of the well known print designer Katsukawa Shunsho, continuing to learn the craft and hone his skills for a number of years. The style of his early prints followed the tradition of his teachers; but a highly personal style, marked with vivacity and humor, emerges in the first of fifteen volumes of his collected sketches, *Manga*, published in 1814.

Hokusai's justly famed "Thirty-Six Views of Fuji," showing the mountain in all its seasonal moods and guises and from imaginative vantage points, were executed between 1823 and 1830. One of these, "The Great Wave off Kanagawa," had a

"Camellia Flowers and Sparrows in Falling Snow" (c. 1837), by Utagawa Hiroshige. This is a later edition of the print originally published c. 1832. Toulouse-Lautrec, Gauguin, Van Gogh, Cezanne, and Whistler were among those Western artists particularly indebted to Hiroshige for a fresh vision of nature. The Clarence Buckingham Collection. © The Art Institute of Chicago. All rights reserved.

"A Picture of Prosperity in America" (1861), by Utagawa Hiroshige II (1826-1869), son-in-law of Utagawa Hiroshige. This rather sketchily rendered, cartoonlike triptych is of greater interest historically than as a work of art, and it is apparent from the fanciful mountain peaks and palm trees embellishing the background that the artist had never set foot in America. The print was probably copied, in part, from a copper engraving of Fredericksborg Castle, Denmark. Gift of Mrs. E. C. Chadbourne. © The Art Institute of Chicago. All rights reserved.

particularly strong influence on members of the art nouveau group in Europe in the latter 1890s.

Though chiefly known for his landscapes, Hokusai excelled in the human figure and in birds and flowers as well. He also did a phantasmagorical series depicting tales of the supernatural, figured with grinning skulls and skeletons, and another series devoted to the celebrated poets of China and Japan. More than 30,000 original designs have been attributed to Hokusai.

The modern creations of Christo and Oldenburg seem a little less daring when we consider that more than a century ago, the brash and colorful Hokusai executed pictures 120 feet high, using a broom for a brush—according to legend. Perhaps anticipating the recent spoof in which a painting by an ape was formally exhibited as a human work of abstract art, Hokusai allegedly coaxed a rooster, whose claws had been daubed with red paint, across a blue sheet of paper. "Maple Leaves on the Tatta River" is the title he is said to have given the rooster's creation.

At 75 he wrote, "Up to the age of 50 I made a great number of drawings; but I am dissatisfied with anything that I created prior to my seventieth year. At the age of 73 I, for the first time, began to grasp the true forms and nature of birds, fishes, and plants. It follows that at the age of 80 I shall have made great progress," signing himself "The Old Man Mad with Painting." At 89 Hokusai's dying words were "If the gods had given me only ten years more —only five years more—I could have become a really great painter."

Utagawa Hiroshige (1797-1858), regarded in some quarters as Hokusai's rival in the landscape, is best known for his "Fifty-Three Stations on the Tokaido," published in 1833 or 1834. His early work was in the traditional vein, reflecting the influence of Chinese painters and a Japanese school of realism; and his subjects during this period were commonly actors, courtesans, and samurai. But around 1828, stimulated by the work of Hokusai, 37 years his senior, Hiroshige turned from the human figure to the landscape. While formal design and human activity are of importance in Hokusai's work, Hiroshige was more concerned with seasonal effects upon the countryside.

Sights along the Tokaido (the 300-mile highway linking Tokyo with Kyoto) had long been a popular theme for artists, including Hiroshige's teacher. Hiroshige's series was published to immediate

acclaim, and for a time his renown as a landscape artist eclipsed even that of Hokusai. Few, if any, woodblock prints have enjoyed such long press runs (as many as 10,000) or so many editions as those of the Tokaido series; the result has been that the quality of prints is often greatly compromised. In 1842 a twelve-year government ban on actor and courtesan prints went into effect, resulting in an increased demand for landscapes; Hiroshige, too, helped satisfy this market by increasing his own production.

Among his total oeuvre of some 5,000 designs, Hiroshige also did a series of 119 views of famous sites in Tokyo, his final work. Van Gogh, in 1888, was so impressed with Hiroshige's genius that he painted fairly literal reproductions in oil of two prints from this series: "Plum Garden at Kameido" and "Sudden Shower at Ohashi," even signing them in Japanese.

Hiroshige's life was cut short at age 61 by cholera, during an epidemic.

"London with Bridge and Fleet" (1862), by Utagawa Yoshitora (fl. 1836-1880s), a pupil of Utagawa Kuniyoshi. Like Hiroshige II's "A Picture of Prosperity in America" (p. 19), this triptych print is chiefly of interest for its vision of a Western metropolis through Japanese eyes. Though the color has been applied with somewhat less than rigorous care and there are inadequacies of register, Yoshitora is clearly more faithful to details of dress than Hiroshige II. The horses' bridles and ships' rigging are done with particular fidelity. Note, however, the Japanese-style bridge lanterns and that in the alcove to the right. The caption on the center panel reads: "London is on the Thames River and has a great number of large houses and buildings. People are rich on the whole. There is a long bridge on the river, which is about 180 feet long and about 40 feet wide. In the evening, three lamps are lit on the bridge to light the way. There is a fortress by the bank to defend the city against the enemy. In the city, there are several market places opened for traders from all over the world. The population is about 1,050,000 and the number of university students is more than several thousand. The women are affectionate and the men intelligent, with a high ambition to succeed in business. They have built more than 28,000 large ships for trading and there are about 185,000 workers on the ships. It is said that their naval ships number over 800 and are equipped with 40 to 120 cannon." Gift of Mrs. E. C. Chadbourne. © The Art Institute of Chicago. All rights reserved.

Utagawa Hiroshige II (1826-1869), also known as Ichiusai Shigenobu, was Hiroshige's adopted son as well as his son-in-law. It is believed that he assisted in some of Hiroshige's last work or completed it after the senior's death. He was the first of Hiroshige's many followers, but his work is generally considered flat, uninspired and, at best, workmanlike imitations of the master.

Utagawa Yoshitora (fl. 1836-1880s), a minor artist whose real name was Nagashima Tatsugoro, was a pupil of the great Kuniyoshi (1797-1861). His work coincides with the end of the *ukiyo-e* period.

Saito Kiyoshi (b. 1907), who is still living, has gained an international reputation, his work being particularly prized by American collectors. Kiyoshi began as an oil painter, achieving some distinction in this medium; while still young, however, he turned to the woodblock print, which seems to have offered better opportunities for his artistic expression. Typical subjects of his mature years (the 1956 print of Boston, Massachusetts notwithstanding) have been Buddhist temples and statuary, rock gardens, and *shoji* screens. By Kiyoshi's own account, the most important influences in his work have been European—Gauguin, Redon, Munch, and Mondrian. The chain of influence had come full circle. FM

"Nostalgia, Boston" (1956), by Saito Kiyoshi (b. 1907). Gift of Mr. and Mrs. Albert L. Arenberg. *© The Art Institute of Chicago. All rights reserved.*

The Respirator Or Smoke Strainer —An Unusual Eskimo Artifact

by James W. VanStone
Curator,
North American Archaeology and Ethnology

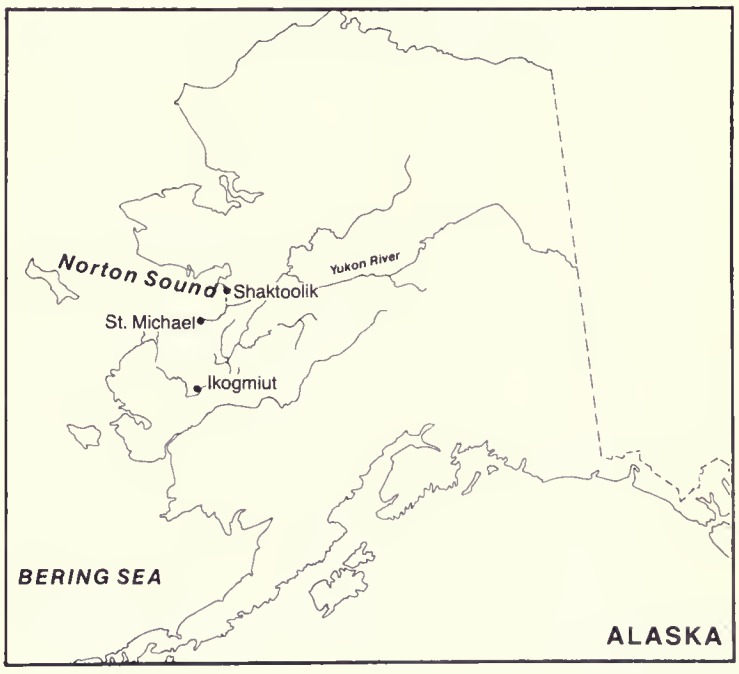
An important diversion for Eskimo men in the villages of southwestern Alaska today is the steam bath, and in many villages a small bathhouse stands beside each dwelling. The custom of bathing in extreme heat is not new to the Eskimos of this area, but the use of a small bathhouse is quite recent. Before discussing certain items of material culture associated with bathing, it is necessary to consider the steam bath in historical perspective:

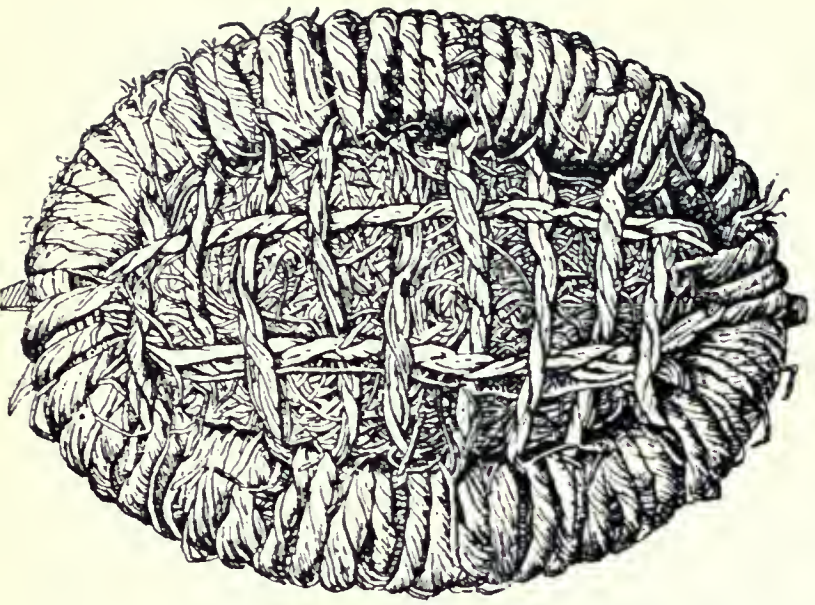
In prehistoric times, and until as recently as 1950 in a few Eskimo villages, the men took baths in the *qasiq*, or ceremonial house. These square, semi-subterranean structures were similar in construction to family dwellings, but much larger, sometimes as much as 25 feet (7.6 m) on a side, and had a single raised bench around the walls. The cribbed roof was open at the top and there was a large central fire pit and short entryway.

Although the *qasiq* was found throughout much of Alaska, it was along the Yukon River and in adjacent areas of southwestern Alaska that the lives of Eskimo men were more intensively focused on ceremonial houses (see map). From the age of 10 onwards, males lived primarily in the *qasiq*; older boys learned craft skills there and listened to the myths and traditions recounted with enthusiasm by the oldest men. Ceremonies, particularly those intended to increase the supply of game animals as well as purely social events, were held in the *qasiq*, and male visitors from other communities were housed there. *Qasiq* residents were usually brought meals by their mothers or wives; unmarried males always slept there and married men usually did (see the *Bulletin*, November 1982, pp. 12–15).

Often the men and boys would take a "fire bath" in the *qasiq*. Dry wood was stacked in the large central fire pit and ignited. The smoke escaped through the skylight and after the wood had burned down to a layer of glowing coals, a cover was placed on the skylight. The men and older boys sat naked on benches along the walls, while younger boys sat on the floor or near the entrance, where there were cool drafts from outside. Until the smoke cleared from the room, the bathers coughed sporadically; they then sat back and enjoyed the heat, chatting occasionally about family matters and daily activities. Afterward they bathed in urine kept in a large wooden tub in one corner of the *qasiq*. The urine, combined with body oils, served the same purpose as soap. Sometimes the bathers, on leaving the *qasiq*, poured water over their bodies or rolled in a snow bank.

After 1830, with the arrival of Russian traders and missionaries in southwestern Alaska, the idea of the steam bath was introduced. The Russian-style bathhouse was usually a small, low-roofed, tightly fitted log structure covered with sod. Inside were wall benches and a fireplace covered with a grill on which stones were placed. The smoke from the wood fire passed from the building through an opening in the roof. After the stones had heated and the fire had died down, the ashes were removed from the fire pit. Then the roof opening was covered and water was splashed on the hot rocks to produce





1. From: Nelson, E. W., The Eskimo About Bering Strait. *Smithsonian Institution Press, 1983 (fig. 96, p. 288).*

waves of steam. Later stoves were made from old oil drums, with a chimney pipe fitted to the drum. The oil-drum stove served to eliminate the irritating smoke, some of which had always remained in the bathhouse; as the result of this innovation, the popularity of the steam bath greatly increased. It is this type of bathhouse and bathing arrangements that are found in the Eskimo villages of southwestern Alaska today.

An interesting artifact associated with the traditional fire bath but also occasionally used later in the steam bath is a respirator, or smoke strainer, which the bather held in his mouth in order to protect his lungs not only from smoke lingering in the room, but from the intense heat generated in the fire pit. These respirators, which covered the mouth, chin, and a portion of the cheeks, were usually make of fine shavings of willow or spruce wood that were shaped to form an oval pad.

Edward William Nelson, a collector of ethnographic material in Alaska for the Smithsonian Institution in the early 1880s, obtained an extremely well-made respirator in the village of Shaktoolik on Norton Sound; it is now in the National Museum of Natural History in Washington. This respirator (fig. 1) is slightly larger than 4 × 5 inches (10 × 13 cm) and constructed of a very fine wood shavings. The smooth, oval outline has been achieved by means of a ropelike band of shavings tightly wound with a cord of the same material. Inside this oval ring is a soft mass of shavings held in place by a netting of loosely twisted cord. The respirator is convex on the outside and concave on the inner surface; the shavings are packed loosely on the inner side and held in position by a horizontal wooden rod which the wearer grips in his mouth.

There are two interesting early illustrations which show men wearing respirators made of wood shavings or of grass. The earlier is a drawing made in October, 1866, by William Healy Dall, a pioneer student of Alaskan natural history, at the village of Klikitarik on Norton Sound east of St. Michael. This drawing (fig. 2) from Dall's notebooks shows a man seated cross-legged and wearing a respirator very similar to the one described and illustrated by Nelson. He also wears a cap, which was the only other item of apparel worn inside the bathhouse; the hair, if not covered or dampened, could become very hot and uncomfortable. Such a cap was usually made of the skin of some waterfowl, usually a loon. The bird's skin was cut open along the breast and removed complete, except for the neck, wings, and

2. Courtesy Smithsonian Archives (SI neg. no. 80-1377).

3. Courtesy Dept. of Anthropology, Denver Museum of Natural History (DM neg. no. 82-003).

legs. The skin was then dried and softened so as to become pliable and the two ends were fastened together in such a way that it could be worn on the head.

The man is shown in this drawing dressed in a parka of animal or bird skins which, of course, he would not be wearing in the bathhouse. Obviously Dall asked someone to pose outside so that he could make a drawing showing the cap and respirator.

The second illustration (fig.3) is a photograph taken at the village of Ikogmiut on the lower Yukon River. The photographer and date are unknown, but presumably the picture was taken sometime during the last decade or two of the nineteenth century since a log cabin and a canvas tent may be seen in the background. A man is shown seated on the ground, cooling off after taking a steam bath. He is wearing a respirator that covers a large part of his face. In front of him is a basin, not of urine, but of water, with which bathers washed themselves in more recent times.

Today, respirators of wood shavings or of grass are seldom used except by very old men, and the head is usually covered with a towel. **FM**

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Stephen Jay Gould Honored

Stanley Field hall provided an awesome setting when the Founders' Council gathered there on November 1 to honor the distinguished scientist Stephen Jay Gould. Dr. Gould, professor of geology at Harvard University, curator of vertebrate paleontology at the Museum of Comparative Zoology, and a MacArthur Fellow, became the first recipient of the council's Award of Merit; the new award consists of a $1,000 prize and a plaque bearing a commemorative inscription and the Founders' Council emblem, designed by Skidmore Owings & Merrill. Dr. Gould, who may be best known to Museum members for his recent book, The *Mismeasure of Man,* and for his monthly column in *Natural History,* adds the award to an impressive array of honors for his contributions to science and for his advancement of scientific literacy, a goal he furthers so eloquently in his frequent essays.

The evening began with a reception for Dr. Gould beneath the glittering chandelier of the Founders' Room. Participants and honored guest then adjourned to the Great Hall, where a festive atmosphere had been artfully created by Dinner Co-chair Mrs. Byron C. Karzas.

Founders' Council Chairman Thomas J. Eyerman and Dinner Co-chair William L. Searle welcomed the assemblage and set the evening's agenda. Chairman Eyerman reported that the council had grown to some 250 members and that in a year's time it had contributed almost $1 million to the Museum. He gave special thanks to the council's membership chairman, Harry I. Skilton, and paid tribute to Mrs. Donald C. Geaves and Mrs. John C. Meeker; Mesdames Greaves and Meeker had developed an innovative series of seminar/luncheons with curatorial staff, an activity which has given council members deeper insight into scientific work being done at Field Museum.

Eyerman also announced plans for the council to initiate a special program called "Field Museum:

At Founders' Council Dinner

Above: The evening's guest of honor, Stephen Jay Gould, right, with Field Museum Director Lorin I. Nevling, Jr. In other photos, Founders' Council members, Field Museum staff, and friends are shown during the evening's activities. N83795

Photos by Ron Testa

Ambassador to the World." This is designed as an outreach program to garner public attention and to promote understanding of the unique functions of Field Museum as well as its international scope.

Dr. Willard L. Boyd, President of Field Museum, then addressed the group, articulating the purpose and meaning of the new award. In doing so, he observed the statuary ("Nature," "Research," "Record", and "The Dissemination of Knowledge") occupying the four corners of the hall and called attention to the considerable museum history that has transpired under the vigilant gaze of these heroic figures. The statues symbolize the mission that both the Museum and the award recipient endeavor to promote. After a brief review of the accomplishments of the evening's guest of honor, Chairman Eyerman presented the award to Dr. Gould.

In a recent essay Dr. Gould noted that it was his purpose to inform and never to bore his audience. As a teacher and essayist, he has succeeded in this endeavor with uncommon distinction, and now as a speaker he further demonstrated that the art of communicating difficult ideas effectively and with wit is a special gift indeed.

Dr. Gould chose as his evening's topic the current controversy over the causes of dinosaur extinction. Reviewing the various theories, he clarified the role of the element iridium in the most widely accepted theory, set his own position neatly within the framework of the controversy, and explained why. His capsulization of this complex issue gave further proof of Dr. Gould's mettle. A "Death Star" (the media name for a theoretical companion sun to our own which might explain the extinction cycles) and geologic anomalies may never be household topics, but under Dr. Gould's entertaining tuition, they became accessible to all.

Field Museum is deeply grateful to Dr. Gould for his participation and to the Founders' Council for their tireless efforts on the Museum's behalf.

—Charles Buzek
Assistant to the President

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

March 1985

Exhibit THE ART OF CAMEROON Opens March 9

Members' Preview March 8

Tamara Northern Lectures on

CAMEROON SECRET SOCIETIES March 21

Donald Johanson Lectures on

LUCY AND OUR AFRICAN ANCESTORS March 23

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COVER

Zofoa II, fon of Babungo, a kingdom in the grasslands of northwestern Cameroon. A fon is the sacred representative of the founding dynasty of a kingdom in the Cameroon. He is the chief priestly leader as well as the cultural guardian and principal actor in ceremonies, rituals, and secular affairs of the kingdom. Zofoa II is shown here surrounded by some of his royal regalia. Art objects of the Cameroon, including pieces such as these, will be on view in the exhibit "The Art of Cameroon," at Field Museum March 9 through June 16. See pages 11-22. Photo by Tamara Northern, curator of the exhibit, courtesy SITES. Copyright © 1984 Smithsonian Institution.

BACK COVER

Nineteenth-century prestige cap from the Cameroon, 27cm high. This type of cap, made of cotton and adorned with glass beads, is typical of those worn by kings, princes, and royal retainers of the Bamum, a kingdom in the eastern grasslands of northwestern Cameroon. From the Museum für Völkerkunde, West Berlin. This cap and about 120 other pieces will be on view in the "The Art of Cameroon." Photo by Dietrich Graf.

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Events

Film as Document

Cameroon Secret Societies

Tamara Northern, Curator of Ethnographic Art, Dartmouth College, and Curator, the Art of Cameroon

Thursday, March 21, 7:30 pm, James Simpson Theatre

The activities of the men's secret societies of the southwestern and coastal forest groups of the Cameroon are sparsely documented. A large part of the documentation that exists was compiled by missionaries and, often, does not provide a culturally relative view. These groups formed a central institution serving ritual needs of the people, preserving forest art traditions, and instructing young males in social and moral behavior. Membership in the men's secret societies was open to all men. In effect, however, fee requirements limited access to all but a few. Their meeting grounds and proceedings were not accessible to nonmembers or to women.

Tamara Northern, curator of ethnographic art, Dartmouth College, provides narration and personal commentary for a selection of five rare documentary films detailing the secret and unknown activities of these men's groups. The films form a central core to the field work of German ethnographer Dr. J. Koloss, and include private scenes of annual festivals, sacrifice, ritual purification, and a performance of the night masks.

Tickets: $5.00 (Members: $3.00). Fees are nonrefundable. Please use attached coupon to order tickets. Public Programs ☎ (312) 322-8854.

Palaeoanthropologist Donald Johanson lectures March 23

Lucy and Our African Ancestors: 4 Million Years of Controversy

Donald Johanson

Saturday, March 23, 2:00 pm, James Simpson Theatre

Bitter battles have frequently erupted in the search for our human ancestors. Beginning with the discovery of the Taung baby by Dr. Raymond Dart in 1924 to the recent finds in East Africa, the field has been dominated by extraordinary differences of interpretation which have sometimes divided scholars so deeply that productive discourse has become impossible. Dr. Johanson examines recent criticism of Lucy, a tiny lady three feet tall, who weighed 60 pounds and lived some 3.5 million years ago, and of other fossils which he has assigned to *Australopithecus afarensis*. He traces the discovery of our African ancestry, now dating back 4 million years.

One of the world's leading paleoanthropologists, Donald Johanson was born in Chicago and received his M.A. and Ph.D. from the University of Chicago. In 1973, when Johanson was codirecting the International Afar Research Expedition, he discovered a perfectly preserved knee joint at the Hadar site in Ethiopia; this historic discovery represented the oldest anatomical evidence for human bipedal stature and locomotion —the hallmark of humankind. The following year, also at Hadar, he found Lucy; the year after that, the "First Family." From 1974 to 1981 he was curator of physical anthropology and director of scientific research at the Cleveland Museum of Natural History. In 1981 he became director of the Institute of Human Origins in Berkeley, California, where he is currently based.

Tickets: $7.00 (Members: $5.00), Fees are nonrefundable. Please use coupon to order tickets.
This program is funded in part by the Ray A. Kroc Environmental Foundation. Public Programs Information: (312) 322-8854

Edward E. Ayer Film Series

Thursdays in March and April, 1:30 pm

James Simpson Theatre

March 7: *Great Railway Journeys of the World: Deccan*
March 14: *Baobab: Portrait of a Tree*
March 21: *Great Railway Journeys of the World: Three Miles High*
March 28: *Audubon*

CONTINUED⇨

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Events

March Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council. These public programs are free with museum admission, tickets not required.

March

2 11:30 am. *Ancient Egypt* (tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

1:30 pm. *Tibet Today* (slide lecture). See Lhasa and other towns now open to the public.

9 1:30 pm. *Tibetan Borderland* (slide lecture). Explore Bhutan, "Land of the Thunder Dragon," and important sites of Buddhism in Nepal.

10 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

16 12:30 pm. *China's Wondrous Animals* (slide lecture). Look at real and imagined beasts in Chinese art, lore, and social life.

17 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

23 1:30 pm. *Treasures from the Totem Forest* (tour). A walk through Museum exhibits introduces the Indians of southeast Alaska and British Columbia and their totem poles and masks.

24 1:00 pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

2:30 pm. *Life in Ancient Egypt* (tour). Focus on the objects and practices which illustrate ancient life in the Nile Valley.

30 1:30 pm. *Traditional China* (tour). Examine the imagery and craftsmanship represented by Chinese masterworks in our permanent collection.

31 1:00 pm. *Spring Wildflowers* (slide lecture). View wildflowers you can see in the woods, meadows, and prairies of the Chicago area.

Family Feature

Masks of the Cameroons

March 23 and 24, 1:00 pm-3:00 pm
Ancient China Hall, Third Floor

People throughout the world use masks for holidays and festivals. The African people of the Cameroons use masks in religious and political dances and ceremonies. Some masks are made to be worn by a tribal king only. Cameroon masks are made to symbolize special things to the members of the tribe. White chalk around the eyes, ears and mouth identify the wearer as a carrier of bad news. If a mask is carved with a certain type of hat, it may mean the wearer is an official. Certain tribes are represented by different types of animal masks. Find out how these beautiful masks are made and make a symbolic mask of your own. Bring your mask back to Field Museum on Sunday, May 19 to wear in our Festival of Masks.

Family Features are free with museum admission and no tickets are required.

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OUR ENVIRONMENT

Endangered Species List Modified

Forty-six more native and foreign animals and plants, ranging from China's giant panda to the diminutive bumblebee bat, thought to be the world's smallest bat, were added to the U.S. List of Endangered and Threatened Species during 1984. Among United States species, the Wyoming toad, the woodstork, and the woodland caribou are all now protected by the Endangered Species Act.

With these additions, the number of endangered and threatened species on the list now stands at 828, of which 331 species are found in the United States and 497 are found solely in other countries. The grand total includes 297 mammals, 220 birds, 99 reptiles, 85 plants, 62 fishes, 24 clams, 16 amphibians, 12 insects, nine snails, and four crustaceans.

In addition to the new listings, 54 other species were proposed in 1984 for listing as endangered or threatened. Among these are the wide-ranging interior least tern and piping plover, plants as exotic-sounding as the Last Chance townsendia and the large-flowered fiddleneck, and the Perdido Key beach mouse, believed to be the nation's most critically endangered small mammal.

There was good news for several species that appear headed toward eventual recovery. The arctic peregrine falcon and the Utah prairie dog were moved from "endangered" to "threatened" listings—reflecting an improvement in their status. The tiny snail darter—a southern Appalachian member of the perch family that sparked the most celebrated court test of the Endangered Species Act—was likewise reclassified to "threatened," thanks in part to the discovery of small numbers of the fish in additional locations.

Other species on their way to a more secure future include the southeastern population of the brown pelican, whose removal from the endangered list has been proposed, and the Florida population of the American alligator, whose numbers have increased sufficiently that limited harvests of the reptile may be permitted, similar to those already held in Texas and Louisiana.

The Endangered Species Act entered its second decade in 1984. It is considered the world's foremost law protecting species faced with extinction. Among its major features are penalties for harming endangered animals, obligations placed on federal agencies and projects under federal license or sponsorship to protect endangered species, and the listing of threatened and endangered species eligible for protection under the act.

"The addition of any new species to the endangered species list is no cause for celebration," says Robert Jantzen, director of the U.S. Fish and Wildlife Service. "But such listings enable us to extend legal protections to these species and focus national and international attention on their plight. Our goal is eventual removal of all species from the list as recovery efforts for each of them are successfully concluded."

Listing is only the first step toward bringing a species back from the brink of extinction. Using the goals established by recovery plans for formally designated endangered species, biologists, conservation organizations, and state and federal natural resource managers attempt to improve a species' status through research, habitat protection, increased law enforcement, improved land management practices, captive breeding, relocations, and establishment of experimental populations. There are now 164 approved recovery plans for endangered and threatened species—an increase of 54 plans over 1983.

"Endangered" means that a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means that a species is likely to become endangered.

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The Silver Lining Of a Very Dark Cloud

Botanical Studies in Coastal Peru During the 1982-83 El Niño Event

by Michael O. Dillon
Assistant Curator, Vascular Plants
Department of Botany

Photos by the author

The 1982-83 El Niño-Southern Oscillation, by all standards, must rank among the most devastating acts of Nature to be recorded during this century. The term El Niño ("little Christ Child") was coined long ago by Peruvian fishermen who annually witnessed the warming of the coastal waters just after Christmas. However, the 1982-83 reversal of the normally cold-running current off the western coast of South America created climatic conditions that were felt around the world (see September 1983 *Bulletin*).

The southern coast of California had record rains, the mild 1983 winter throughout the northern states caused severe spring flooding, and on the other side of the world drought plagued Africa, Indonesia, and Australia. In similar fashion, as torrential rains fell on western South America, the high-elevation southern Andean Sierra of Peru and Bolivia continued a seven-year drought.

The worldwide combined loss of human life from floods, polluted water supplies, and drought has

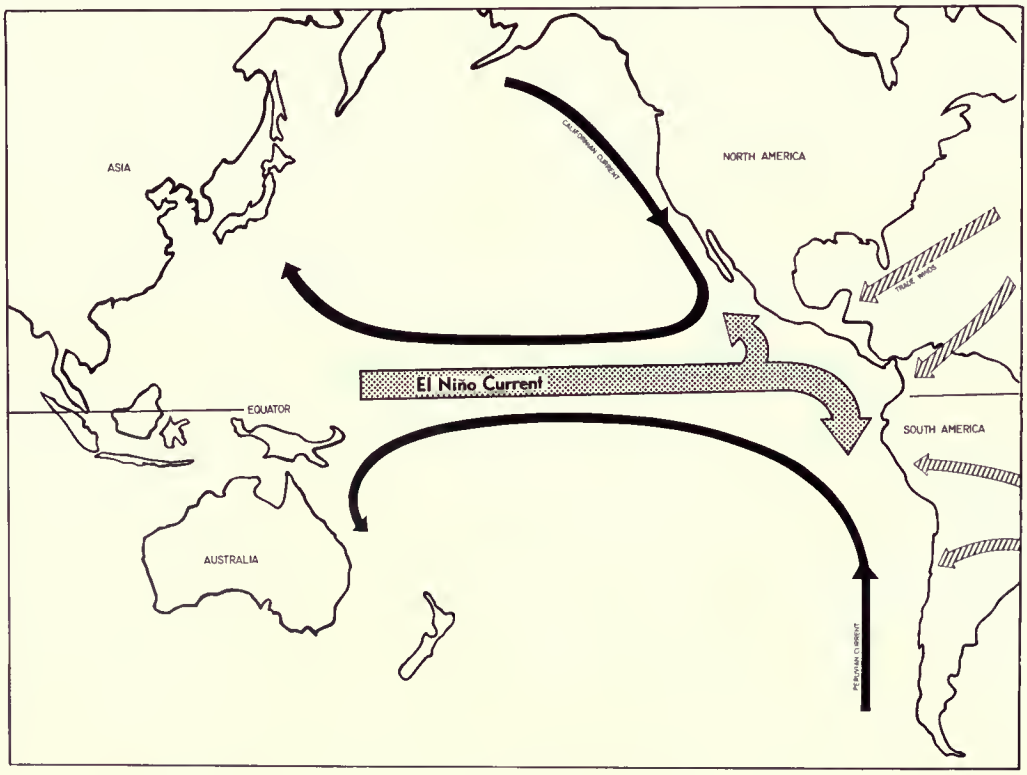


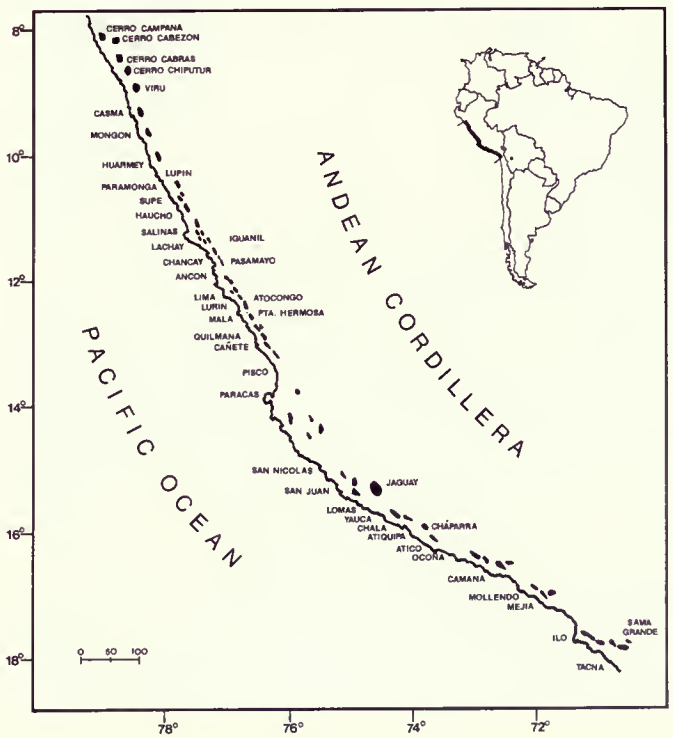
Fig. 1. *Schematic representation of El Niño current in the Pacific Ocean.*

been estimated at more than 10,000. Property damage has been estimated in excess of $10 billion, but rebuilding continues today in Ecuador and Peru, with ultimate costs unknown. However, along with all the adverse effects came a rare opportunity for the modern scientific community to study this age-old phenomenon.

The last recorded El Niño of major proportions was in 1925, when scientists had neither the tools nor the mobility to study the phenomenon on a global scale. Minor El Niño events were recorded in 1957, 1965, and 1972, but historical records indicate that El Niños have been occurring at least since 1541. The reasons for El Niño events continued to elude scientists; however, this time scientists were poised to study the phenomenon as never before.

By mid-1982, scientists monitoring climatic conditions predicted the coming event, but not its magnitude. As the normally strong westerly winds slackened, satellites equipped with infrared sensors and ships at sea began recording rising water temperatures off the west coasts of North and South America. The cur-

Fig. 2. *(above) Camp site in the barren desert east of Camaná, Arequipa in southern Peru.* Fig. 3. *(below) Distribution of lomas formations within the coastal desert of Peru.*



rent along the equator, normally east to west, was reversing itself and forcing warm water up and down the coast from Alaska to Chile, thus displacing the cold-running currents that normally flow from both poles (fig. 1).

These oceanographic changes stimulated unprecedented rainfall. Hardest hit was coastal Ecuador and Peru where record rains fell, causing massive flooding that destroyed roads, agricultural irrigation systems, and disrupted drinkable water supplies. Many towns and villages were left isolated for up to two months, as bridges on primary and secondary roads were wiped out and swollen rivers could not be forded. Peru's offshore anchovy and sardine fishing industry was devastated as the cold, nutrient-rich waters were displaced by warm, nutrient-poor waters. Central Pacific seabird populations experienced dramatic reductions in population levels because of the lack of fish and squid, their primary food source. Some seabird colonies, notably those of the Christmas Islands, completely disappeared, abandoning

Fig. 5. *The lomas of Atiquipa display a rich variety of annual herbs very near the Pacific Ocean (background).*

Fig. 4. *A few trees persist in the lush hillsides of the lomas of Mejia, Arequipa.*

nest and young. Numbers of salmon returning to the rivers of Alaska and Canada were at unusually low levels. But, in the midst of this colossal disaster came an opportunity to study the effect of El Niño on the unique South American coastal vegetational formations known as "lomas."

Lomas Formations

The western coast of Peru and northern Chile is the world's driest desert, where virtually no precipitation occurs below elevations of 1,500 meters. This severe aridity is due to a climatic regime dominated by a constant temperature inversion which is generated, in part, by the cold, north-flowing Peruvian (Humboldt) Current. At some localities, however, wet sea-fog drifts landward, settling on low coastal hills. Where this fine precipitation (*garua*) is heavy enough and lasts long enough, a remarkable seasonal flora develops: the *lomas*. These communities occur not as a continuous band along the western coast but rather as an "island archipelago" within the desert,

separated by large expanses of unvegetated arid land (fig. 2). They contain high numbers of endemic genera and species, *i.e.*, those occurring in only one ecological or geographical locality. Present data suggest that no less than 20 percent of the species found within the lomas formations are narrow endemics; higher figures are expected in certain localities.

Within coastal Peru, significant desert rains occur only in association with rare, but recurrent, El Niño perturbations of normal marine and meteorological currents of the Tropical Pacific Basin. In 1983, the events previously outlined stimulated a uniquely rich bloom within these communities, and species numbers and density were at high levels.

National Geographic Society and Field Museum (Jack C. Staehle) funding* was used to support approximately eight months of field work during this rare meteorological period. The objectives of this study were: (1) to sample and catalog the flora of the Peruvian lomas throughout their range while species diversity and quantity were at peak levels; (2) to initiate investigations of the chemistry of selected endemic species as an aid in establishing phylogenetic relationships between lomas species and their extra-lomas relatives; (3) to establish and support a collecting program within the lomas by Peruvian students; and (4) to use the compiled data to construct hypotheses concerning the probable age, climatic dynamics, and floristic origins of these unique formations.

The geographic distribution of plant species within lomas formations gives an indication of their origins and past events. Traditional views hold that true islands have derived their floras through independent dispersal events and thus tend to be in disharmony. They have a mixture of species different from those found in neighboring mainland communi-

*See November 1984 Bulletin: "The Right Gift at the Right Time," pp. 24-26.

Fig. 6. Nolana adansoni *is a member of the family Nolanaceae, a group of plants found exclusively in lomas formations of coastal Peru and Chile.*

ties. This also appears to be true for lomas "islands," where the flora appears to be derived from several sources and to be introduced during different periods. The composition of the present-day flora undoubtedly reflects the past climatic and geologic events that have shaped the lomas archipelago.

The dynamics of lomas endemism and of how plants came to colonize the fog-island archipelago is potentially related to rare episodes of El Niño rainfall; such episodes possibly provided "bridging conditions" by means of precipitation levels sufficient for populations to expand their normally restricted distributions. Areas that had been lifeless desert for decades supported lush plant growth during the unusual 1982-83 El Niño. These sporadic episodes of unusual precipitation are responsible for dramatic increases in total numbers of reproducing individuals and, in turn, for high seed productivity; this activity allows replenishment of seed banks, a necessity for plants within unpredictable environments.

Preliminary Results

No comprehensive data is available on species composition and distribution within lomas communities of Peru. Several investigators have compiled species lists for individual lomas or regions; however, the nomenclature is often outdated and/or inconsistent, and species concepts vary widely. Therefore, initial efforts have focused on the collection of lomas plants throughout Peru during this period of exceptional moisture availability. Two collecting trips were made by the author during 1983, in January-February and in October-December. Collections and ecological observations were made throughout the Peruvian lomas from the department of La Libertad (8° S latitude) to the department of Tacna (18° S latitude). Unusually high levels of species diversity and population numbers were present, and about 600 collections of flowering plants and ferns were made in sets with 6 to 10 duplicates each. Species composition varied greatly but consisted as a rule of annual and perennial herbs, including tuber-bearing, bulbous, and rhizomatous elements. There were a few shrubs, and isolated relictual* stands of tree species persisted at a few localities.

The majority of lomas plants are rare or poorly represented in North American herbaria (systematically arranged plant collections). In many instances, the specimens made during this period marked the first or second collection for Field Museum's herbarium. Duplicates are now being distributed to specialists for identification and additional duplicates are being distributed to Peruvian institutions and to the major herbaria of the world.

At present, little is known about the fauna of lomas formations. Collections of insects and arachnids (spiders) were made at each lomas location. Special attention was given to the collection and observation of pollinators. Identifications of these are still in progress.

Future Objectives

Continued sampling of the lomas communities is necessary in order to develop as complete a data base as possible. This data base will be used to construct a comprehensive inventory of the lomas formations. However, recent field studies in October-December 1984 indicate that the effects of the 1982-83 El Niño were quite ephemeral. The lushness of 1983 has once again been replaced by stark desert. In fact, in many lomas the contrast was dramatic (fig. 3). Areas that usually have some vegetation every year were devoid of plant life, and in others the species diversity was at extremely low levels.

Additional collecting expeditions are planned by the author for the future and an in-depth survey of existing herbarium specimens in various South American and North American herbaria will continue. In future field seasons carbon 14 dating of the lomas will be initiated by running C 14 assays on humus deposits created by the lomas plant communities through time. This data will allow additional confirmation of the dynamic structure of the lomas and the evolutionary development of their floras.

Ultimately, the results of this project will be made available to the Peruvian government in the hope that they will help to identify areas in need of preservation and conservation. At present, only one lomas formation has been set aside as a national reserve: Lomas de Lachay, approximately two hours drive north of Lima. In the future, additional lomas formations should be set aside as reserves to ensure the survival of their unique plant and animal life. FM

I.e., relatively few survivors remaining from a once-thriving community.

Prestige cap, 19th or early 20th century; knitted and crocheted cotton, 20 cm high. This especially elaborate cap was ceremoniously worn by the fons and title holders. Collection of Bryce Holcombe. Photo by Malcolm Varon.

The Art of Cameroon

by Tamara Northern

IT IS THE AIM of this exhibition to acquaint a large and diverse public with the significance and splendor of the art of Cameroon. From the very inception of this project, the issue of what constitutes the art of Cameroon, a contemporary African nation-state, had to be addressed. An astonishing number of major African art traditions must be considered in any presentation of the arts from within the boundaries of the present United Republic of Cameroon. Ethics, politics, and exhibition philosophy have all had to be weighed.

Nearly all contemporary African nations encompass within their boundaries — which are the legacy of former European colonial policies — multiple and diverse ethnic groups with an attendant

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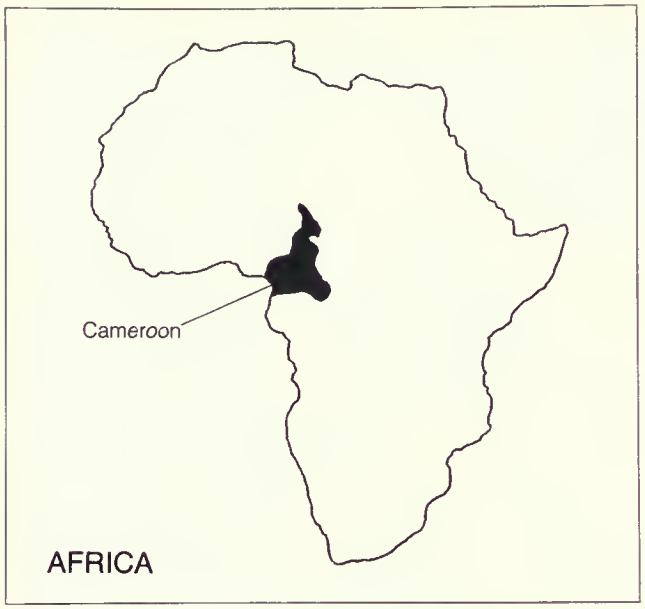
This article by Tamara Northern is from the introduction (with minor adaptations) to her book, The Art of Cameroon, *© 1984 Smithsonian Institution, and is reproduced here (as are the illustrations) courtesy of the author and of* SITES.

The exhibit, The Art of Cameroon, *was organized and circulated by* SITES *and made possible by a grant from Mobil Corporation.*



cultural pluralism. Cameroon is no exception. Cameroon, however, is rivaled by few other African nations in the range of extremes characterizing its ecological and cultural zones. Its southern and coastal regions are dense with tropical rainforest; the coastal volcano Mount Cameroon registers one of the world's highest annual rainfalls—more than 1,020 centimeters per year. Toward the northeast extend the savanna plateau of the Grassfields and the Adamawa Highlands, which are among the highest inhabited elevations in Africa, . . . while the extreme north is characterized by semiarid steppes bordering on the south shore of Lake Chad.

In these widely differing natural environments developed the many culture patterns of Cameroon. We are still only at the fringes of an understanding of

Royal flywhisk, early 20th century. Wood, cloth foundation with glass beads and cowrie shells, horsetail; figures 20 cm high. Collection of Bryce Holcombe. Photo by Malcolm Varon.

Royal stool with symbiotic leopard-elephant caryatid, 19th century. Wood with overlay of tin, 43.5 cm high. Collection of Museum für Völkerkunde, West Berlin. Photo by Dietrich Graf.

Cameroon's prehistory, but we may assume that small-scale human populations of stone-age culture inhabited this area for several millennia. In the extreme north at Lake Chad there is archaeological evidence of developed traditions in terra cotta sculpture and bronze and copper artifacts from the Sudanic Sao culture dating to circa A.D. 900-1500. Throughout the course of prehistory and history the populations of Cameroon developed distinct forms of culture as much in relation to their natural habitats as in response to contact with each other. The history of Cameroon, whose course for the past three hundred years has only recently begun to emerge from archaeologic and linguistic evidence supported by oral traditions, presents a complex mosaic of relationships among groups of people sometimes related and sometimes distant in origins. Contact between them was at times peaceful and integrative, at times forceful and violent, leaving the conquered and the victors to evolve a modus vivendi for cohabitation. As Cameroon's culture areas were constituted at the time of intensive European contact — the last two decades of the nineteenth century, which saw the beginning of both colonization and written history— they exhibited distinct features.

The northern part of Cameroon, including the Adamawa Highlands, is inhabited by indigenous groups of sedentary agricultural people, including the cluster collectively known as Kirdi, and by nomadic Fulani cattle herders....

The Fulani, whose origin is in Senegal on Africa's west coast, entered the region about three hundred years ago. They live dispersed throughout the northern regions of all West African countries. They

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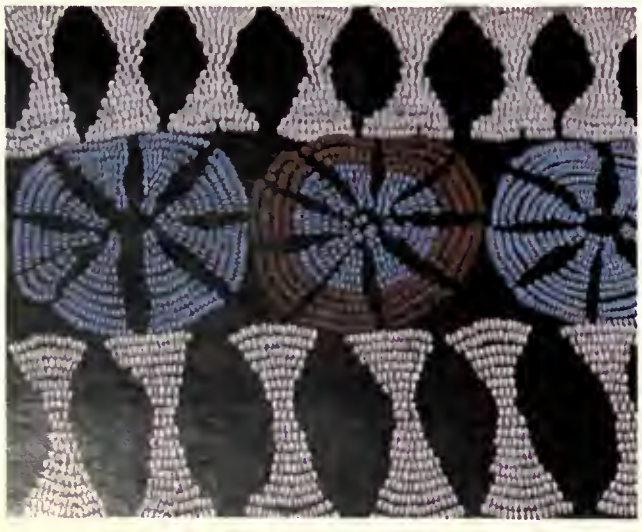
speak a language of the same Niger-Congo derivation as the Bantu languages of Cameroon. The Fulani lived in peaceful symbiosis with the indigenous farming populations until the early nineteenth century, when most of them joined the Islamic crusades initiated by northern Nigeria's Islamic emirates. They adopted the Islamic faith and became militant missionaries in its service.

Some of these Islamized Fulani groups developed powerful states, lamidates, in Cameroon, modeled after the Nigerian emirates, and comparable to medieval European city-states with centralized political systems and administrative, judicial, and political institutions. As horse-mounted warriors, the Fulani became legendary and feared as raiders in search of slaves and tribute-paying subjects to sustain the elaborate organization of the lamidate courts. In the nineteenth century, until colonial intervention curtailed them, the raids were directed largely to the south, and the nineteenth-century history of the Grassfields is to a considerable degree shaped by the population displacements caused by these raids.

Islam has remained the cultural denominator in the north of Cameroon. The material culture and artistic traditions of the non-Islamic farming groups are realized mainly in pottery, weaving, and the arts of personal adornment in metal and beads. In the Islamic culture context, the accoutrements of the horse-and-war complex and the garments worn by warriors have received material and visual elaboration.

Elephant mask with leopard crest (detail of beadwork), 19th century. Collection of Field Museum #174145. Photo by Fleur Hales Testa.



The savanna plateau of the Grassfields, an intermediate environment between the northern semiarid steppes and the coastal and southern rainforest, is home to a multitude of chiefdoms, polities varying in size from a few hundred people to fully developed state formations with populations numbering in the tens of thousands. The population density, uncommonly high for Africa, was estimated even at the turn of the century at an average of forty people per square kilometer—with a yet higher concentration in the southwestern Grassfields. The languages spoken are all classified as Semi-Bantu and derive from the Niger-Congo language family. Language density is also one of the highest on the African continent: In the western Grassfields (the present Northwest Province) alone, at least twenty-four languages are spoken by only 450,000 people.

The Grassfields are a relatively homogeneous culture area, whose main features are political centralization around a king or fon, palace administration, social arbitration by men's secret societies, and an elaboration of material culture climaxing in one of the richest art and sculpture traditions of Black Africa.

For the past three centuries, Grassfields history —including the genesis of chiefdom formation—has been determined by continuous small-scale population movements. The resultant contact dynamics were instrumental in the emergence of a social stratification differentiating between royals, commoners, and slaves. In the early nineteenth century, these movements were occasioned largely by raids from the north by the Bali-Chamba groups and the Fulani. Populations escaping the pressure of the invaders would settle in another area, often dislodging its settled population in turn. But by the mid-nineteenth century most ethnic groups had established themselves as polities in their present locations.

Located between the north and the coastal south, the Grassfields were open to the inroads of trade from both directions. Peaceful and profitable trade with the northern areas of the Benue Valley

Royal memorial figures, carved of wood, from the kingdom of Kom, early 20th century. The figures are embellished with glass beads on cloth, with cowrie shells and facial sheaths of bronze. Heights 159 cm, 163 cm, 155 cm. These figures are on view at the royal palace, Laikom, Cameroon. Photo by Tamara Northern. ▸

and the Adamawa Highlands was conducted probably for centuries, although we have most evidence for the nineteenth century. Through a long-distance network of Hausa traders who encroached upon the Grassfields from their home base in northern Nigeria in the wake of the Fulani, ivory and kola nuts were traded against cotton cloth (Jukun cloth), embroidered robes, beads, brass bars, and salt from the north.

For the Cameroon estuary at Douala there is some evidence of trade—including slaves—between coastal people and the Portuguese and Dutch traders of the early seventeenth century. For the time from the late eighteenth century until the mid-nineteenth, the evidence is complete for the Cameroon estuary as one of the active entrepôts for the trans-Atlantic slave trade. Direct transactions with European traders were conducted by merchant entrepreneurs, often the chiefs of the coastal groups, notably the Douala. But the long-distance network via intermediary traders extended into the Grassfields. Eventually, the coastal trade of slaves, and to a minor degree ivory, in exchange for European firearms, salt, and other foreign luxury goods supplanted to a considerable degree trade with the north. After abolition of the trans-Atlantic slave trade, the Grassfields continued to supply the indigenous coastal palm oil plantations with slave labor to satisfy the Grassfields chiefdoms' demands for luxury goods.

The vast area of Cameroon's western and southern rainforest is inhabited by a multitude of ethnic groups whose culture patterns and art traditions manifest great diversity, while at the same time sharing certain features. The groups may be separated into western, coastal, and southern inland forest dwellers. People of the western groups speak Semi-Bantu languages, as do the Grassfields populations to the east and the Cross River groups in the west in adjacent Nigeria, while the coastal and southern populations belong linguistically to the large conglomerate of Bantu speakers of Central Africa.

Subsistence in the rainforest is based on agriculture, and the common framework for the social and political organization derives from the patrilineal lineage and village organization. In each ethnic

Memorial figure of a royal titled wife, 19th century. Wood, 74 cm high. Collection of Valerie Franklin. ▸

group, the small-scale village communities whose members are commonly kin-related are autonomous units of egalitarian structure. Social and political stratification is absent, as is political centralization. Intervillage cooperation is realized in the defense of common interests and to some degree in the marriage exchange of women.

The western and coastal provinces share the prominent institution of men's secret societies, which serve as supralineage organizations for social arbitration and for intercourse with the supernatural (not unlike the West African Poro secret societies). These societies provide the context for masking traditions and for a tradition of complex and diverse figural sculpture.

In the southern inland area, the distinct culture complex of the Beti-Pangwe groups and their northern affiliates predominates. The core of this culture—which manifests one of Black Africa's best known art styles, that of the Fang—lies in the nations of Gabon and Equatorial Guinea, Cameroon's southern neighbors.

The precolonial history of the southern and coastal Bantu peoples can be partially reconstructed from oral traditions and documented events of the nineteenth century, such as the Fulani expansion. We know that from the seventeenth century onward, group migrations, some of them over considerable distances, led to successive shifts of population toward the coast and the southern inland region. The far-reaching consequences of northern Fulani expansion are seen in the early-nineteenth-century migration of the Beti-Pangwe and related groups from a northeastern forest location into their present southern forest settlements to escape the encroaching Fulani. Earlier population movements led the Douala from a southern locale to their present coastal site in that part of the Cameroon estuary formed by the Wouri River.

The geographic location of the coastal Bantu groups led to their direct and fateful exposure to a succession of European navigator-explorers and merchants who increasingly plied the African coast during the eighteenth and nineteenth centuries in search of useful and exotic native goods and slaves. This long but intermittent contact through trade conducted on derelict and abandoned merchant ships in the Cameroon estuary was intensified during the lat-

Elephant mask, 20th century. Raffia splints, cloth foundation for glass beads, 135 cm high. Collection of Bryce Holcombe/Mark Rabun. Photo by Malcolm Varon.

Royal stool with double-headed elephant caryatid, 19th century. Wood with glass beads on cloth foundation, 40 cm high. Collection of Field Museum #175558b. Photo by Fleur Hales Testa.

ter half of the nineteenth century by the permanent establishment of German commercial coastal stations, and it was soon followed by the development of oil, rubber, and cocoa plantations. This economic appropriation by Germany resulted in the annexing of Cameroon as a German colony in 1884. The Douala assumed a prominent position in the direct transactions with Europeans on the one hand and in the control of the hinterland trading networks on the other. After the 1830s, this influential trading empire catapulted the Douala into the central role of negotiators with the British and later German commercial agents. The treaty of 1884, signed by the Douala kings Akwa and Bell, conceded Cameroon as protectorate and colony to Germany.

Centuries of contact between coastal peoples and Europeans initiated a slow but constant process of culture change, which, especially during the early exploitative colonial period, starkly modified traditional culture patterns. One is tempted to speak of cultural erosion. However, ethnic pride and identities, a shared sense of discrete history, beliefs, and some social institutions survived—testimony to the adaptability of human cultures—despite the inexorable alteration of the fabric of society. Especially vulnerable were the art traditions of these coastal groups. The figural sculpture and the masks used in their practices of secret society rituals were soon decimated by early European curio hunters and by zealously righteous missionaries. At first it was under duress, but eventually the practical realities of changed lifeways asserted themselves and the forbidden, clandestine need for those visual symbols succumbed to diffidence. Virtually no art for indigenous purposes has been made by the coastal forest people since the very early part of this century, and none has survived in situ.

Presenting the art of Cameroon in an exhibition required some difficult choices, given the area's historical and cultural diversity and its multiple ethnic art traditions in each of three broad culture regions. I felt strongly that this choice should be based on a viable exhibition concept that would honor the diversity without dissolving into mere enumeration. The exhibition is thus constituted with a focus on the Grassfields and its perimeters, while the northern and forest areas are selectively featured. The Grassfields are a proportionately small geographic area of

Royal pipe bowl, 19th century. Terra-cotta with partial nickel overlay, camwood residue, 24 cm high. Collection of Museum für Völkerkunde, West Berlin. Photo by Dietrich Graf.

Royal stool with leopard caryatid, 19th century. Wood, with glass beads on cloth foundation, 57 cm high. Collection of Field Museum #175560. Photo by Fleur Hales Testa.

Cameroon, but their wealth of artistic tradition in various media and types surpasses that of any other, and Grassfields sculpture ranks among the most renowned of African art. Also, the homogeneous cast of the Grassfields culture recommends itself in an exhibition seeking to explore the discourse between socio-political value and visual metaphor.

The Grassfields are also representative, in that their populations share with the western and coastal forest groups an ancient culture stratum, one element of which is the prominent institution of men's secret societies and their sacra in the form of masks and figures. I therefore felt it appropriate to select some forest art from this context. Such a selection explores and explicates a contextual continuum, while demonstrating the discrete cultural and visual permutations within specific ethnic groups.

Two important styles of sculpture whose radius extends geographically into Cameroon have not been included because their cultural anchors lie in neighboring countries. These are the Cross River masking complex of Nigeria and the art forms related to the Beti-Pangwe, whose principal cultural sites are Gabon and Equatorial Guinea. This exclusion was made in deference to the inherent cohesion of culture areas whose manifestations should best be seen in relation to their core traditions. Additional curatorial considerations based on aesthetic preference, first-hand familiarity, and the very real logistic constraints of a loan exhibition will reveal themselves.

Whenever possible, objects from the nineteenth-century traditional context were sought, and many of those in the exhibition are among the very first to have been brought out of Cameroon. Others lack any documented collection history, but share the same traditional origin. "Traditional" here applies to viable cultural practices and conventions that are indigenously African; it does not imply an immutable, fixed state. There is ample evidence of the continuous processes of change affecting cultures over time. In an indigenous African frame of reference, the nineteenth-century cultures of Cameroon represented a peak of development, to which the art

Male mask, 20th century. Wood, cowrie shells, glass beads, traces of camwood, 34 cm (without fringe). Collection of Valerie Franklin. ▸

Prow ornament of canoe model, 19th century. Wood, paint, 200 cm long (entire model). Collection of Field Museum #175469. Photo by Fleur Hales Testa.

works from this period, while not the only, are surely the most dramatic and persuasive remaining testimony. These works embody the fruition of a rich and complex cultural legacy.

Cameroon's entry into the twentieth-century coincided with the imposition of colonial governance. Traditions, including those of art, continued to change, but after colonization, the change was of a different quality and alien. It was a response to values and norms of the European industrialized world. It was fast and relentless for some groups, such as the coastal Bantu and the Grassfields kingdom of Bamum, gradual and less incisive for others. Many of the traditional art forms are as alive in the present as they have been in the past. Some are disappearing, and all have adapted to the changes of the late twentieth century. But the young nation Cameroon exercises prudent stewardship of its diverse cultural heritage and proudly supports its continuation in the framework of a contemporary nation-state.

An Ancient Egyptian Prayer

A Beginner's Exercise For Those Who Would Learn Hieroglyphics

by Charles Buzek
Assistant to the President

The most recent example of Egyptian hieroglyphic writing dates from A.D. 394. These inscriptions were found on what was once the island of Philae, which now lies submerged in Nile waters held by the Aswan Dam. Leading backward into antiquity from that date, we have a 3,000-year continuum of hieroglyph use—a longer tradition of writing than anything we know from our European cultural antecedents. This three-millennium record has provided us with the rare opportunity to know the thoughts and share the dreams of men and women who lived when most of the world was still locked in barbarism and ignorance.

When Jean Francois Champollion solved the mystery of these strange but beautiful inscriptions early in the nineteenth century, he opened a whole realm of research and scholarship that has continued to increase our understanding of the language and its grammar. Countless epigraphic (inscription) surveys have produced a flood of material that histories are made of. Most of these inscriptions have been prayers, magical formulas, and spells, often so arcane that we can only speculate about their meanings; but it is unlikely that the ancient Egyptians understood these writings much better. The power of these symbols, after all, lay not in their content, but in actually reciting them.

The best known among these prayers is the *htp di nsw.* These three words, taken from the prayer's opening, remain almost unchanged from the earliest dynasties to the latest. For the amateur Egyptologist stunned by textual difficulties of the written language and dismayed by the amount of time needed to develop a working vocabulary, this prayer, in particular, can be a most useful tool. Understanding it can also enable one to translate some of the inscriptions one may see in Field Museum's Hall of Ancient Egypt. It is the purpose here to provide an introduction to this prayer and to the study of monumental hieroglyphics—the written language of the ancient Egyptian monuments. Examples of text used here are all from inscriptions to be found in the hall.

The prayer *htp di nsw* is easy to recognize when seen by itself, but may be less so within the context of other inscriptions. By examining monuments with such inscriptions, the viewer will come to know where the prayers are most apt to be found in any particular relief; with a little experience he will also be able to spot individual differences in ancient artisans' techniques of incising hieroglyphs.

Beginning at the north end of the case along the east wall ("Casts of Egyptian Sculptures"), the first example of the prayer is on a section of the false door (an original, not a cast) from the tomb of Setjew, described as "overseer of the craftsmen." This spelling of the name, which differs from that given in the case label copy ("Sethau"), might be a good point at which to deliver a useful aside: The sounds of ancient Egyptian are a matter of conjecture among scholars, for the reason that vowels were not expressed in their writing, just as they are not shown in the writing of present-day Nile dwellers.

Educated guesses about how ancient Egyptian was spoken have been made on the basis of dialects which have evolved from the original tongue and also from the ways in which early Egyptian words were later blended into Greek and Latin; but none of these attempts to reconstruct the sounds of the bygone language are entirely satisfactory. According to current practice, the title of the prayer under discussion here would be *"hetep di nesw,"* but no pronunciation of this could be cited as more accurate than any other.

Returning to the relief of Setjew, we see a bas-relief of him seated at a table. Directly below this scene is a box containing a number of hieroglyphs.* This text is the earliest version of the prayer in the Museum's collection, probably coming from the Third or Fourth Dynasties (30th-28th century B.C.). Among the hieroglyphs in this box are some common, easily recognizable representational figures, such as

Left of "king" is the recumbent figure of a dog-like figure, representing the jackal-headed god Inpu, also known as Anubis. The remainder of the glyphs in this inscription are much abbreviated and crudely cut. The quality of Egyptian inscriptions, it should be noted, varies not only with the artisan's skill, but with the amount that the candidate for eternity was willing to pay for his stone-cutting. Artisans usually

The tomb of Setjew—a portion of the false door. PS48

birds. The inscription reads in the direction opposite that in which these figures are facing—from right to left. The text is arranged, by and large, horizontally, as are the other versions of the prayer discussed here, though vertical arrangements are not unusual.

Beginning at the right, the first words in the formula are 𓇋 *nsw* (or *nesw*), which means "king," and *htp (hetep),* which means "boon" or "gift." A third word, hardly recognizable, is a triangular shape just to the left of *htp*. This glyph is transliterated *di,* meaning "to give." It will be more legible in inscriptions discussed further on.

As in Chinese writing, the pictographic element in a glyph is often a good clue to its meaning. Thus, the symbol 𓇋 is the sedge, a plant common in Upper (southern) Egypt, where it became a symbol for kingship. In Lower (northern) Egypt, the bee became the symbol for kingship. The symbol 𓊪, "boon" or "gift," is an offering stone—a flat slab seen from the side. The triangle-shaped glyph for "give," 𓂝, discussed above, probably represents a cone of unguents or incense. Its representation in later times — an extended arm, with a cone in the palm—makes the meaning clearer.

were not scholars. They reproduced copy prepared by priests or scribes, but often did not know the meaning of what they carved. Some reliefs and stelae, with glyphs crudely cut and jumbled, appear to have been done in haste; portions of glyphs or entire symbols might be omitted. Other difficulties could be created by more artistically inclined stone-cutters, who would change the word order for aesthetic effect alone. Though sometimes frustrating for the translator, these departures from convention can also lend a charming element to an otherwise sterile text.

Setjew's relief has given us the prayer's first component, which we may now translate: "A boon which the king gives to Inpu." (Gods other than Inpu, especially in later times, might also be invoked.) The inscription reads 𓇋 𓂝 𓊪 *htp di nsw.* The transliteration (which is in correct order grammatically) does not follow the order of the hieroglyphs. In writing, as in life, it was the king's privilege and custom to precede all others; hence, the inverted arrangement—a departure from grammatical convention in deference to his majesty.

Immediately to the right of the Setjew inscription in this same exhibit case is the door frame of one Katepi, apparently one of the engineers who worked on the Great Pyramid of Khufu during the Fourth Dynasty (29th century, B.C.). His list of titles includes "Overseer of the Work," a fairly common title but in

**The terms "glyph" and "word" are used interchangeably here with "hieroglyph."*

this case making it quite clear that he participated in some way in constructing one of the Seven Wonders of the World.

The artisan has placed Katepi's prayer at the top of this door frame. Reasonably complete and considerably more complex than the example we have just examined, the Katepi inscription is in raised relief, achieved by the laborious process of removing the mass of material surrounding the glyphs. The alternative to this technique—sunken relief—was far simpler to carve, but often less aesthetic. Either method, in any case, was so costly and time-consuming that even the wealthy came to recognize the advantages of painting over stone-cutting.

Again, beginning from the right, the initial elements of the prayer on Katepi's door frame are easily visible and the figures handsomely cut—*nsw* ("king") at the upper right, *di* ("to give") to the left of *nsw*, and *htp* ("boon" or "gift") directly below the first two. Although inscriptions of the prayer for the next 2,000 years may have individual differences, these three words will be almost constant.

Here the prayer is again directed to Inpu, and we find the gracefully rendered representation of this jackal-headed god immediately left of *di*. The three characters below Inpu, , *hnti sh ntr (khenti seh netjer)*, may be translated "(who is) in front of (his) divine booth." The "booth," , may be the place where embalming was performed, with which Inpu had some connection in Egyptian mythology. , *ntr*, a glyph frequently seen in inscriptions, loosely designates any god. Its position next to the noun indicates that here it is an adjective modifying and translated accordingly as "divine." , *hnti*, a representation of a temple utensil or ornament, functions in this text as a prepositional element: "in front of." The three-word phrase *hnti sh ntr* is specific for the god Inpu and used only when he was being invoked. In later dynasties the god Wesir (Osiris) was more commonly invoked.

The second major part of Katepi's prayer concerns one of the principal motives of the *htp di nsw*—a request to be buried in the necropolis. The vocabulary for this segment consists of the group , *krst*, "burial," and , *hrt-ntr*, "necropolis."

The next part of Katepi's prayer betrays the very human reluctance to reap his posthumous benefits prematurely; a good old age is requested for the engineer: *i3w* nfr wrt (yaw nefer wert)*, "[he having reached (implied in the text)] a very good old age." , *i3w*, obviously represents a bent old man leaning on a cane—personifying old age. , *nfr*, meaning "good," "beautiful"—the cross-shaped top of which has been broken off here—appears with great frequency in inscriptions. , *wrt*, means "great" or "large." For the sake of brevity, artisans often used just by itself to convey "having reached a very good, old age," or similar idea.

The following phrase in Katepi's prayer expresses the worthiness of the deceased; he is the "possessor of blessedness," *nb im3h (neb imackh)*, "before the great god" *hr ntr '3 (kher netjer aa)*—apparently a formula for establishing the candidate's moral and religious qualifications. In prayers of later times there appear phrases speaking of never having done anyone harm and of having clothed the naked.

**The Arabic numeral "3" within the transliteration "i3w" is a conventional phonetic device approximating a short "a."*

The tomb of Katepi—a portion of the door frame. N68391

The tomb of Iry—a portion of the door frame. N68396

Having established his worthiness in the eyes of the diety, Katepi now requests various provisions to sustain him in the afterlife. Consequently he requires an invocation-offering *pr hrw (per kherew)*, literally "a going forth of the voice," *n*, "to"; *f*, "him." This phrase is probably a magical formula which, by reciting it, will guarantee the deceased all his needs. This would be followed by a list of items, often abbreviated to the basics: "bread," *t*, and "beer," *hnkt (henket)*. A more complete list would also include "beef," "fowl," "clothing," and "alabaster," (plates, cups, etc.), . These offerings were to be made at "every festival" , *hb nb* (of) "every day," *r' nb*.

Vocabulary for the "hetep di nesw"

king	great, large
boon, offering	lord, possessor
to give	blessedness
Anubis	before
in front of	Great God
booth	going out of the voice
to bury	festival
cemetery	every
old age	day
good, beautiful	

In many inscriptions, the major festivals are then listed, notably the Festival of the New Year and the Festival of the First Day of the Year,

Thus we have the basic text of an Old Kingdom *htp di nsw* prayer: "A boon which the king gives to Anubis, in front of his divine booth, that he (the deceased) may be buried in the necropolis, he having reached a very good, old age, possessor of blessedness before the great god, that invocation offerings consisting of bread and beer may come forth for him at every festival of every day." Individual prayers differ, however, because of local custom, theological affiliation, politics, or simply as the result of the stonecutter's carelessness.

To the right of Katepi's door frame in the same case is another bas-relief inscription, rendered in a quite different style, involving Iry, (or Irii), inspector of priests in the Fifth Dynasty (28th cent. B.C.). Additional complexities of this particular text will be apparent to those who attempt to decipher it. In the opening, for example, the verb and object are doubled —a peculiarity of Fifth Dynasty inscriptions. The artisan also appears to have made an error midway in the text and, in order to cover himself, has taken the liberty of changing the word order.

After the budding translator has negotiated the Iry text, many more inscriptions and even tomb walls in Field Museum's Hall of Ancient Egypt await him. To paraphrase our prayer: The boon that Egyptological research has given is the ability to reach back through the centuries and read the aspirations of an ancient people. We may find them speaking to us on a subject that remains one of the great mysteries—our fate after death. **FM**

The author wishes to thank Dr. Janet Johnson, director of the Oriental Institute, who graciously filled the lacunae in his knowledge of this fascinating subject.

TOURS FOR MEMBERS

Sailing the Lesser Antilles Aboard the Tall Ship *Sea Cloud*

February 7-16, 1985

Our itinerary offers a superb sampling of the Caribbean's best—Antigua, St. Barts, Saba, Martinique, and Iles des Saints. With the professional leadership of Dr. Robert K. Johnson, a Field Museum marine biologist, you will see and experience a great deal more than the conventional sightseer. Dr. Johnson is a topnotch tour lecturer, and your trip will be greatly enhanced by stimulating lectures and field trips. Price range (contingent on cabin selection): $3,455-$5,755. per person (includes round-trip air fare from Chicago, hotel accommodations in St. John's, Antigua, and full board while on the *Sea Cloud*).

The largest private ship ever built, the steel-hulled *Sea Cloud* is 316 feet in length and has four Diesel engines with total power of 6,000 B.H.P. The ship accommodates 75 guests in air-conditioned staterooms, each with two beds. The cuisine is in the best tradition of the great yachts of the past. Expert European chefs provide exquisitely prepared meals accompanied by vintage wines. A crew of 40 German officers and men, plus 20 cadets sail the *Sea Cloud*. There is ample deck space for sunning and enjoying the spectacle of the sails. Life aboard is informal and relaxed, and cruise participants may join in the operation of the sails.

Archaeological Tour of Egypt Including 5-day Nile Cruise

February 15-March 4, 1985

An unforgettable in-depth visit to the Land of the Pharoahs, including a 5-day Nile cruise aboard the luxurious *Hilton Steamer*. An Egyptologist will accompany the tour throughout, including the Nile cruise, and personally conduct all lectures and sightseeing. Tour highlights will include the pyramids and Sphinx of Giza, little-visited monuments of Middle Egypt, King Tut's tomb, the holiday resort of Aswan, and a visit to Abu Simbel.

Additional Tour Highlights for 1985

Galapagos Islands. China and Tibet. Alaska and Pribilof Islands.

Colonial South

April 13-20, 1985

Now you can be among the first passengers to visit the legendary Colonial South in the comfort of a relaxing, yacht-like cruise ship, with a friendly American staff to serve you. Our ports of call will be Savannah and St. Simon Island, Georgia; Beaufort, Charleston, and Hilton Head Island, South Carolina; with disembarkation at Savannah.

Dr. Lorin I. Nevling, director of Field Museum and a distinguished botanist, will accompany the tour, sharing his professional expertise on the flora of the exquisite gardens we'll visit. Our tour is planned to coincide with the spring explosion of color in daffodils, tulips, dogwoods, and azaleas—a welcome treat after Chicago's long winter. Local historians will provide us with talks on historic buildings of the region and on Civil War history. The *Nantucket Clipper* will cruise through the peaceful waters of the intra-coastal waterways, allowing you to spend each evening in town enjoying the port experience to its fullest, and affording even greater variety in this delightful cruise experience.

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, Il 60605

The Art of Cameroon

Opens March 9

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

April 1985

The King's Dance: A Cameroon Celebration

by the Muntu Dance Theatre

April 20

Talking Drums of Africa

April 13, 14

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COVER

Cotton quilt (about 83" square) from Hawaii, made probably befo 1918. On temporary view on the First Floor (formerly designated the Ground Floor), near the Place for Wonder. Cat. 259778. Photo (109505), by Diane Alexander-White. For more on this quilt see page 23.

Kennicott Club Meets

The April meeting of the Kennicott Club, a natural history society named for Chicago's first naturalist, Robert Kennicott, will be held at Field Museum on Monday, April 8, from 7:30 to 9:00 pm. The evening's guest speaker will be Dr. Kenneth Wilson, professor of biology, Purdue University Calumet, whose topic will be "Sex and the Single Orchid."

Any persons with an interest in natural history are invited to attend the Kennicott Club meetings. For further information, please call or write John Clay Bruner, Kennicott Club vice president (Department of Geology), at Field Museum, 922-9410.

Birders: Raise Your Binoculars!

Join Field Museum's weekend birding excursion to Horicon Marsh, Wisconsin, on April 13 and 14. This famous area for observing birds is about 50 miles northwest of Milwaukee. Leader of the tour will be Dr. David Willard, custodian of Field Museum's bird collection. For additional information on this exciting event, please call Dorothy Roder, Field Museum Tours manager, at 322-8862, or write her at Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, Il. 60605.

Events

The King's Dance: A Cameroon Celebration

Muntu Dance Theatre
Saturday, April 20, 2:00 pm
Stanley Field Hall

One of Chicago's premiere dance companies, Muntu Dance Theatre, creates in music, dance, and song, a dramatization of life in a Cameroon village. The King's Dance portrays three days in the life of a fon, the king of a Cameroon village. This dance drama opens with the fon in discussion with the newest of his 36 wives. The routine of a fon's wife proves to be less than exciting as she can no longer go to market—the village social center—and must be content to tend her fields in relative isolation from her family. As the story unfolds we learn of the plot of the selfish Waba who intends to marry his beautiful daughter, Shemsun, to the fon. Shemsun, however, loves a young man from the village. The fon, who must set a good example for his villagers, is put to a test, and whatever his decision, it will affect all in the village.

Muntu Dance Theatre, founded in 1972, is a group full of vitality, humor, music, and powerful dance movements. It has achieved an unequaled reputation throughout the Midwest and in Africa for making a consistent artistic statement of cultural and historical significance.

This program is free with Museum admission and tickets are not required.

CONTINUED→

Muntu Dance Theatre performs Saturday, April 20

CONTINUED from p. 3

Events

April Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed are only a few of the numerous activities available each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

April

6 11:30 am. *Ancient Egypt* (tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

7 11:30 am. *Traditional China* (tour). Examine the imagery and craftmanship represented by Chinese masterworks in our permanent collection.

14 2:00 pm. *Malvina Hoffman: Portraits in Bronze* (slide lecture). Find out about the life and works of Malvina Hoffman, concentrating on the Portraits of Mankind collection commissioned by Field Museum.

20 12:00 noon. *Dinosaur Lifestyles* (tour). Tour contrasts old ideas about dinosaurs with new ones about their appearance, behavior, and environment.

These public programs are free with museum admission and no tickets are required.

Muntu Dance Theatre performs Saturday, April 20

Talking Drums of Africa

Saturday and Sunday, April 13 and 14
1:00 pm
African Cultures Hall, First Floor

The voices of African instruments sing history as well as music. The drum is essential in Africa and its sounds are a language understood by all. Join with Chicago drummer Sabur-Abdul as he demonstrates a variety of drums. Help to create the sounds of Africa as you play the talking drums.

Edward E. Ayer Film Series

Thursdays in April 1985
1:30 pm
James Simpson Theatre

April 4 *The Mystery of Anasazi*
April 11 *Great Railway Journeys of the World: Changing Times*
April 18 *Captain James Cook: South Pacific 1768*
April 25 *Renaissance*

79455

"Exploration '85"

Friday, May 3
5:00–10:00 pm

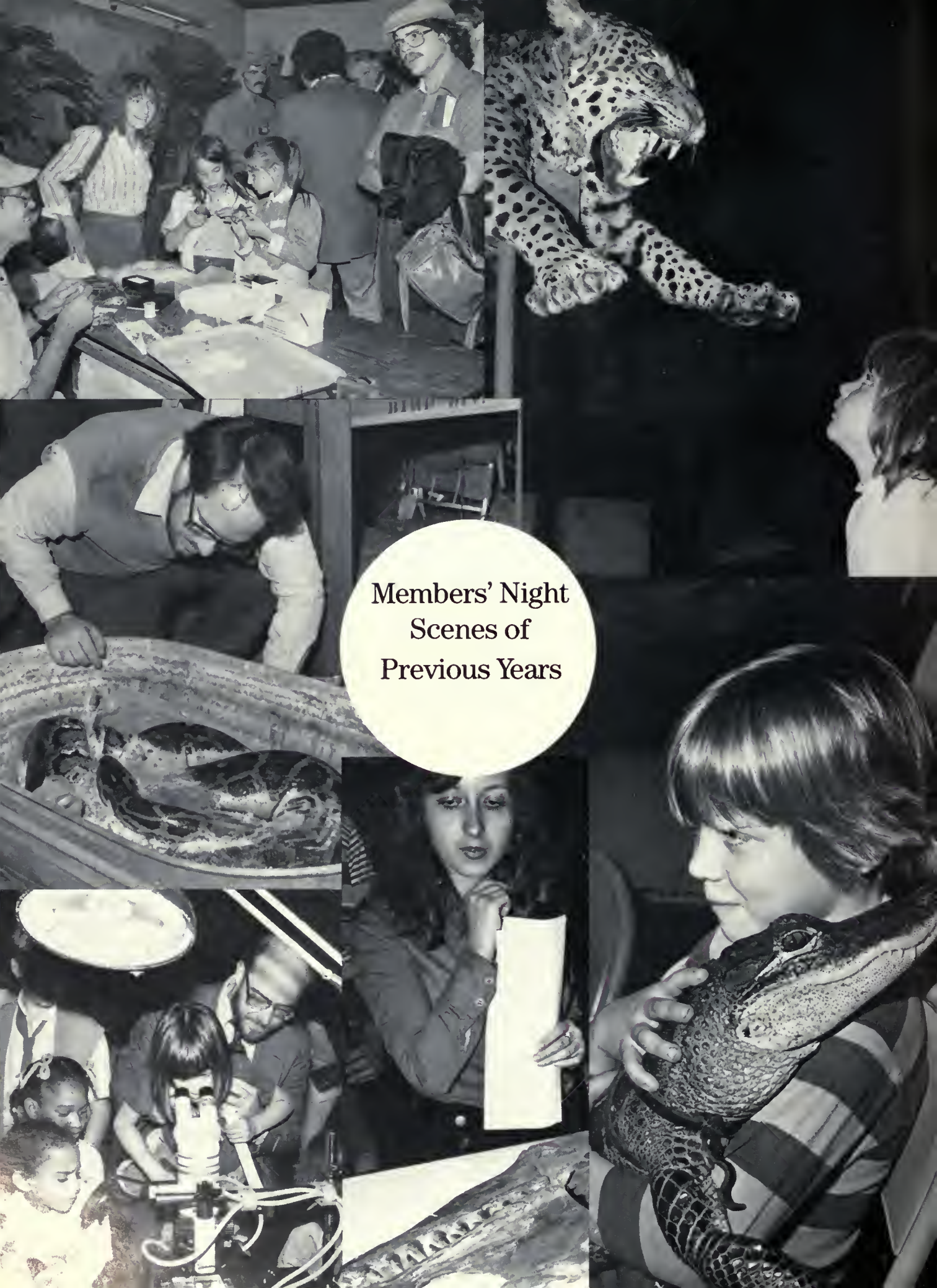
Aren't you the least bit curious? Don't you wonder? Wouldn't you like to wander through some of those "off-limits" areas at Field Museum?

We take great pleasure in announcing our annual Members' Night, and invite you, your family and guests to participate in one of our most popular events.

Once a year we throw open the doors and invite our Members "behind the scenes" at Field Museum to do some exploring on their own. Of course, our staff of world-renowned scientists, curators, and preparators will be available to guide you on this exploration and share the wealth of their experience and expertise. There will also be nonstop entertainment in Stanley Field Hall and an abundance of exciting special exhibits, events, and surprises designed to let your curiosity challenge our collections. This is our chance to salute Field Musuem and its members, and your chance to explore Field Museum—claim it, use it, and above all, enjoy it.

If you are coming by car, you may park free in the Museum's North Lot as well as the Soldier Field Lot. Simply show your membership card or Members' Night invitation. Free charter bus service will be operating between the Loop and our south door. These CTA buses, marked *Field Musuem,* will originate at the Canal Street entrance of Union Station (Canal at Jackson), and stop at the Canal Street entrance of Northwestern Station (Canal at Washington); Washington and State; Washington and Michigan; Adams and Michigan; and Balbo and Michigan.

Buses will run beginning at 4:45 pm and continue at approximately 20-minute intervals until the Museum closes at 10 pm. "Behind the Scenes" activites will stop at 9:00 pm. (Buses will travel to the train stations until the departure of the last train. Please check your train schedule for exact times.) You may board the free *Field Museum* CTA bus by showing your membership card or invitation. Members are invited to bring family and up to four guests at no additional charge. Arrangements for handicapped individuals can be made by calling (312) 922-9410, ext. 453, beginning April 22.



Members' Night Scenes of Previous Years

Chilean Serendipity

Records of a Fortuitous Field Season In Temperate Rain Forests

Primary Valdivian rain forest at 505m. Little light reaches the ground beneath canopies exceeding 100 feet in height. The ground is densely covered by ferns and bamboo. Photo by B. D. Patterson.

by Bruce D. Patterson
Associate Curator of Mammals

BENEATH ITS ORDERLY VENEER, science is serendipitous. It would be interesting to know how much of our present body of knowledge took origin in chance, seemingly incidental discoveries. The father of modern genetics, Gregor Mendel, established basic laws of inheritance from the variations he observed in pea plants. Modern geneticists shake their heads with incredulity that, of all the characters that vary in peas, Mendel chose to look at a few encoded by single genes. Had he chosen characteristics such as leaf length or germination responses (properties controlled by many genes with complex interactions), he would have been unable to formulate his theory.

Science abounds with stories like this. Darwin's

observation of distinct variants among animal populations inhabiting the Galapagos Islands supposedly triggered the development of his comprehensive theory of evolution by natural selection. The universal laws of motion crystallized in the mind of Isaac Newton after he allegedly observed a falling apple. The point of these observations is that science *as a body of knowledge* is neat, orderly, logical, and predictive, like a system of mathematical postulates and theorems. However, science *as a system of gaining knowledge* is fraught with the chance, uncertainty, and luck that characterize all human enterprise.

"Luck" or uncertainty in the scientific process extends to all levels, from the discovery of the last bit of data needed to crystallize new theories (as in the previous examples) to such mundane matters as the proper setting for complex scientific instruments. Nowhere in modern science is this fact more plain than in comparisons of basic versus applied science. "Basic" science is knowledge for knowledge's sake. Questions posed by basic science have no known relation to technological or sociological problems: "Why is grass green?" "Why is the sky blue?" Answers to such questions are incorporated into the ever-growing body of scientific knowledge. "Applied" science, on the other hand, seeks to answer questions of pressing human concern: "What are the effects of DDT and industrial pollutants on birds in urban parks?" "How much corn do natural populations of rodents consume each year?"

It is noteworthy (and reassuring to basic scientists!) that, although 85 cents of every research dollar funds applied research, nearly all scientific breakthroughs are critically based on basic research. We can't accurately say at the time of discovery what use a bit of basic knowledge might have. However, we can observe that applied science, which directly benefits man, is fundamentally dependent on basic research, and that the converse is not true. Basic research adds to the scientific tool box the nuts and bolts that are needed for applied science to work. While doing basic research might seem an "act of faith," a long and rich history documents its essential, fundamental importance.

Volcán Osorno, rising 8,700 feet above sea level, presents one of the most symmetric volcanic cones known. Photo taken at the Refugio. Photo by B.D. Patterson.

So, scientific discoveries usually depend on others having discovered the right nuts and bolts for a given job, and having these at hand at the right time. The usual course of the scientific method is to: 1) begin with a question to be answered, 2) canvas published literature to determine what is known, 3) develop an approach likely to yield relevant conclusions, 4) propose the question and approach to suitable governmental or private funding agencies, and 5) hope for a positive response (!) Only then can one proceed with the execution of the methodology. But, as previously discussed, serendipity plays a role in the conduct of science at all levels. Even if one has all the necessary nuts and bolts at hand and has secured adequate funding, and it only remains to conduct the experiment and collect data, still one never knows until afterwards what the outcome might be.

What follows is a description of scientific fieldwork conducted in Chile last year. As things turned out, it was a fortunate manifestation of scientific serendipity.

Like virtually all Field Museum scientific programs, mine concerns basic research. For the past two years, Milton Gallardo (of Universidad Austral de Chile) and I have worked among the countless islands comprising the coastal archipelago of Chile and Argentina, conducting basic scientific explorations. Our goals are quite humble (especially in view of the introductory remarks!), namely to ascertain what mammal species live on various islands in this archipelago and to determine the microhabitats they live in and the foods they eat. Assembling data on the animals themselves (including their anatomy, chromosomes, and genes), the habitats they live in (estimated from about 20 measurements of habitat structure), and the foods they eat (determined from stomach contents), we hope to address questions of more general interest. These include: 1) How regular are patterns of species distribution in the archipelago? If we know how big, how high, or how diverse an island is, can we predict the number of mammal species it supports? (an important question, given that there are more than 3,000 islands). Do sea-level changes that occurred during the Ice Age influence patterns of island occupation? 2) How integrated are the small mammal communities on these islands? If other species are present on an island, does this change "the economy of nature" for a given species?

Is competition between species evident in food use or space use? Do species shift their "niches" in response to co-occurring competitors? If niche shifts occur, do they involve only ecological attributes or are they also products of deeper-seated evolutionary changes? 3) How do patterns of geographic variation among island populations compare with those on the adjacent mainland, where clinal (smoothly grading) variation seems the rule?

While simple enough at face value, these questions may be very difficult to answer. Some have important implications for biological science as a whole. For example, to answer question 3 above, one needs to sample sufficient island populations throughout an adequate latitudinal range, say 20 islands and 10 degrees of latitude (this is roughly equivalent to 4 years of work). Concomitantly, one needs samples from adjacent mainland localities; in our

The valley at La Picada, taken from trap line at 1,135 m. The transect followed the course of the Rio Blanco, seen here as a light patch of open vegetation. Clouds in the background cover the surface of Lago (Lake) Llanquihue. The roof of the Refugio is visible at 4 o'clock. Photo by B. K. Lang.

case, much of this work has already been done by Field Museum's W. H. Osgood (1875-1947), and his samples are part of the extensive mammal collections at Field Museum. Once collected, both data sets must be analyzed to see whether variation in, say, tail length or the frequency of certain enzymes, follows smooth latitudinal patterns. Finally, the agreement between the island and mainland patterns must be evaluated.

Although this sequence of activities is laborious, the scientific payoff may be rich. There is much current debate over the relative roles of natural selection versus undirected, random change in the evolution of life. If we could demonstrate that strictly concordant patterns of variation exist on the mainland (where adjacent populations are linked by interbreeding and gene flow) and on the islands (where gene flow is absent and each population is fully independent) in response to common environment settings, the role of selection would be greatly substantiated.

In 1983, Gallardo, Kathy Freas (of Brookfield Zoo), and I sampled islands and the adjacent mainland in southernmost Chile, on the Straits of Magellan (54° S latitude). In 1984, I returned to Chile where Gallardo, two of his graduate students (Eduardo Palmas and Gonzalo Aguilar), and I sampled four islands at the northern end of the archipelago (ca. 42° S). At the end of six weeks of field work, the Chilean team returned to campus in Valdivia to begin laboratory analyses. At this point, I set out to secure a mainland sample for comparison with the northern islands.

Previous collections by Field Museum personnel at Volcán Osorno, in the Lake District of Chile, showed that a rich assemblage of small mammals inhabit temperate Andean rain forests there. As many as nine species of marsupials and rodents live in the same or closely adjacent habitats, which raises intriguing questions concerning their population ecologies and mechanisms of coexistence. These have recently become the subject of basic ecological research by Peter L. Meserve (Northern Illinois University) and his Chilean associates Roberto Murúa and Luz Gonzáles (also of Universidad Austral). Since 1979, this team of ecologists has studied the mammal fauna of Valdivian and North Patagonian rain forests using live-trapping techniques. During his 1983-84 sabbatical leave from NIU as a Fulbright Scholar, Meserve conducted an intensive census survey of small mammal populations in two rain forest communities, one of which was at La Picada, a valley on the northern side of Volcán Osorno.

Collaborators in the La Picada study at conclusion of the transect (l. to r.): "Conejo" (nickname meaning "Rabbit"), B. K. Lang, and P. L. Meserve of Northern Illinois University. Photo by B. D. Patterson.

The mammal species that occur at La Picada were of great interest to Gallardo and me. All six of the species we found on the largest island studied thus far (Isla Chiloé) are also found there, with three additional species found only on the mainland. Given the detailed ecological information Meserve and associates have gathered for several common species over the past five years, samples from La Picada would greatly aid our efforts to understand ecological relationships among island populations.

On short notice, Meserve invited me to accompany his group to the volcano. While he and assistant Brian Lang worked their census grids at 450 m and 550 m elevation, I placed lines near the *Refugio* (about 820 m above sea level), where Field Museum curators W. H. Osgood and C. C. Sanborn had collected in 1939-40. During the week we worked on our respective projects, we were each impressed by the quantitatively different views we obtained on the forest's small mammal community: the most abundant small mammal on their grids (a vole-like rodent *Akodon olivaceus*) turned up in my lines at lower frequencies. Conversely, a pouched marsupial named *Dromiciops australis* was far more abundant in my lines than in theirs. By week's end, both Meserve and I had collected all the data needed to answer the questions we had set out to answer: Meserve had his monthly sample from La Picada and I had sufficient material from this mainland locality to compare with the northern islands. However, a new project, replete with new questions and requiring new data, had hatched.

Meserve has followed the waxing and waning of small mammal populations at La Picada from season

to season and year to year. However, his insight into the dynamics of these changes was limited to two nearby points in the valley floor. Declining numbers of rice rats (*Oryzomys*) on his grids during the summer, for example, could be due to uncompensated mortality or instead to their seasonal migration to higher or lower elevations. In addition, two of the most common rodents in the valley, *Akodon longipilis* and *Akodon sanborni*, either converge in color and size or else interbreed, making it difficult to reliably identify them in the field. To understand their ecology, it is imperative for Meserve to know whether they represent one species or two.

On the other hand, Gallardo and I have studied mammal communities from place to place, with an orientation different from that of the ecologists. Like them, however, we had never studied how these communities change at refined spatial scales. The situation at La Picada is excellent for such studies, because it presents an altitudinal gradient along which to study the mammal species. Altitude influences a host of biologically important physical variables, such as precipitation, temperature, and insolation (amount of sunlight), which in turn determine the plant communities that live there and the animal communities that depend on them. Refined studies along altitu-

Forest's edge, near course of the Rio Blanco at 505 m, supported mammals that also occur at higher elevations. Photo by B. D. Patterson.

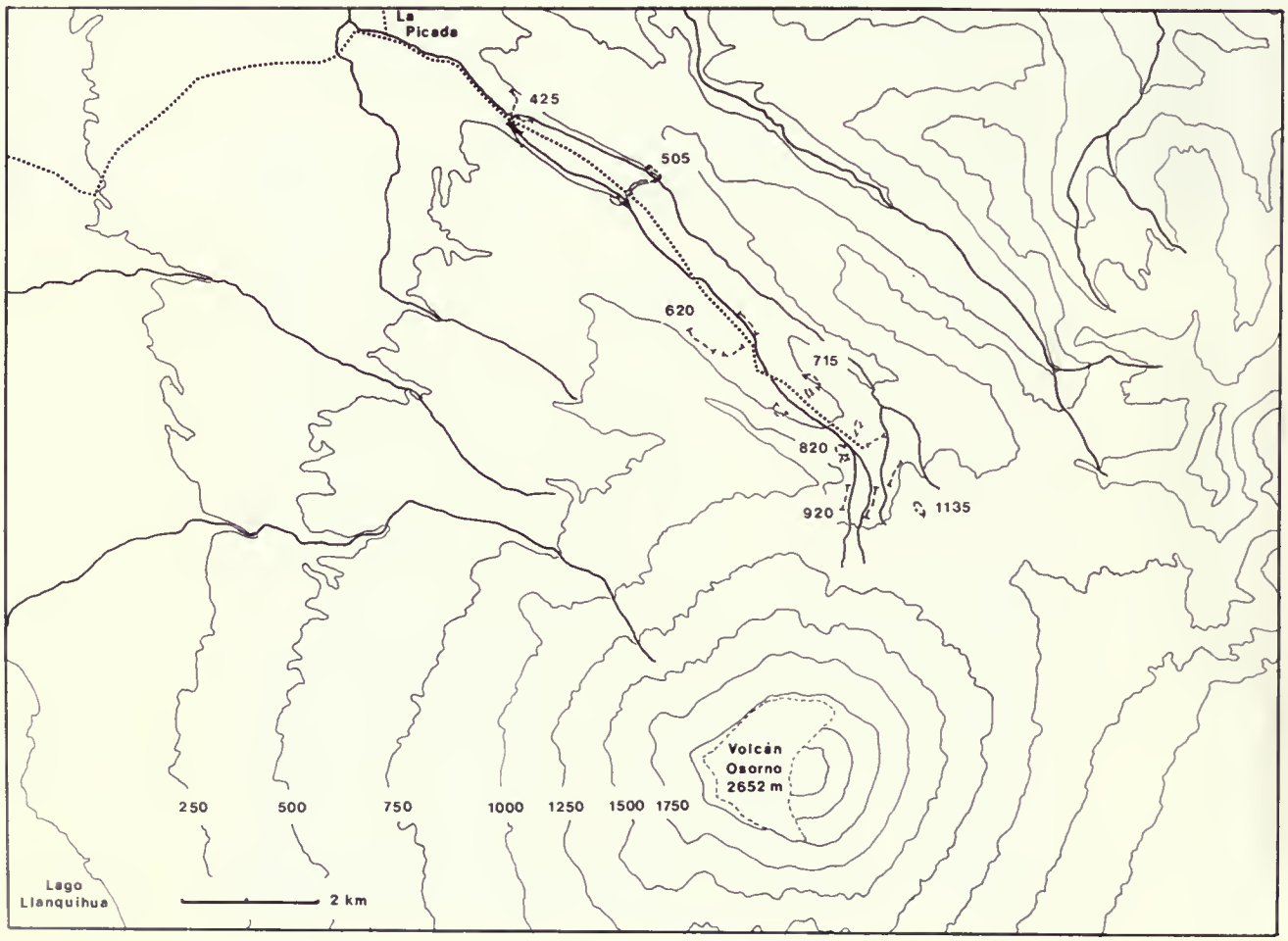
dinal gradients can tell us much about ecological tolerances and evolutionary capabilities of species. Samples taken at different altitudes usually present continously grading differences in temperature, precipitation, exposure to sunlight, soil type and texture, and so forth, producing varying responses in the organisms that live there. By understanding how organisms respond to such an environmental gradient, we can learn how these environmental variables relate to the ecology and evolution of the species under study. Realizing, *in the field,* that a cooperative research program would greatly enhance each of our respective projects, we designed and executed the first altitudinal transect for small mammals in the southern Andes.

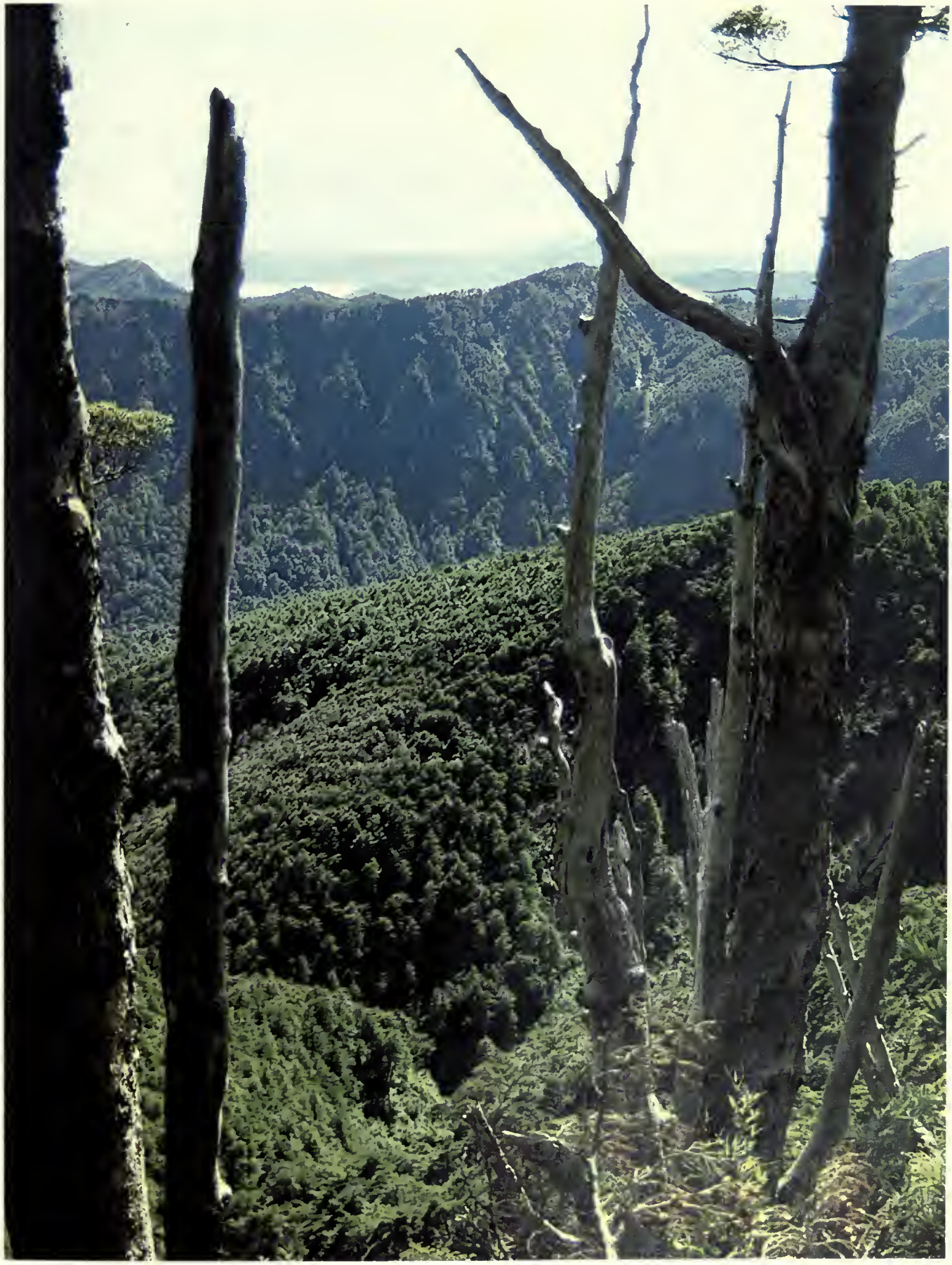
The basic design of the study revolves around altitude, because altitude influences so many other variables. We sought to understand how the small mammal species, individually and collectively, respond to gradually altered ecological conditions. We therefore decided to set trap lines in the valley from top to bottom at intervals of about 100 m. Each trap line was set and run by one of us (Meserve, Lang, or me) for a week.

Forests at the foot of the valley begin at about 400 m elevation, below which cleared farmland predominates. The forests themselves are nothing short of spectacular, containing enormous trees that reach 100 to 150 feet in height. In contrast to the coastal rain forests of Oregon, Washington, and British Columbia (which reach similar stature under virtually identical regimens of temperature, sunlight, and rainfall), the vast majority of Chilean rain forest trees are broad-leaved rather than coniferous. Most common are the southern beeches (*Nothofagus*), which also occur in Australia and (as fossils) in Antarctica.

The transect at La Picada, showing elevational contours (in meters). The road from the village of La Picada to the Refugio is shown by dotted lines; major water courses are indicated by bold lines. The location of each trap line is shown by dotted lines.

Elfin forest at the valley's upper end. Trees here rarely exceed 15 feet in height. Photo (by B K. Lang) taken at 1,135 m.





In fact, the peculiar distribution of these trees in areas now widely isolated from one another provided one of the first biological supports for the theory of plate tectonics, or "continental drift." At lower elevations in the valley at La Picada, *Nothofagus* reach 100 feet in height and more than 6 feet in diameter, but in elfin forests on ridgetops at the valley's upper end, they rarely exceed 15 feet in height. Numerous other trees also make up the "Valdivian," "North Patagonian," and "Subantarctic" rain forest associations, including the wintergreen (*Drimys*), "elm" (*Eucryphia*), laurel (*Laurelia*), *tineo* (*Weinmannia*), *luma* (*Amomyrtus*), and the "southern pines" (*Podocarpus*). Pronounced altitudinal effects in species diversity, stature, cover, and density are evident.

The understory of these forests is equally diverse, but is dominated by dense bamboo (*Chusquea* or *"quila"*) rarely more than 6 to 8 feet tall but dense enough to make foot passage difficult. Enormous ferns abound, some reaching 15 feet in diameter, others "tree ferns" (*Blechnum*) with 5-foot trunks. A number of forest shrubs produce red, trumpet-shaped "hummingbird flowers," including wild *Fuschia*. The ground here is mostly covered by fallen leaves, dense mats of *Sphagnum* and other mosses, and a variety of liverworts.

The author (with Chicago Tribune *news bag for carrying traps) at 820 m. Photo by B. K. Lang.*

We preserved as standard museum specimens all mammals taken in lines we set at each altitude. However, in contrast to "traditional" museum collecting, we also assembled a host of ancillary information taken to answer various ecological and evolutionary questions. These data included: the exact trap station where animals were trapped, preserved stomach contents for dietary studies, preserved organ tissues in liquid nitrogen for studies of genes, reproductive autopsies for studies of litter sizes and breeding seasons, and (where possible) their chromosomes. In addition, we conducted habitat measurements (20 variables) at every sixth trap, so data on genetics, anatomy, and life history could be related to ecological parameters. At the conclusion of our three weeks' work there we had collected more than 500 specimens and taken ecological data at more than 210 stations.

These data are highly significant because they provide an integrated picture of the natural history of this poorly known group of animals. Analyses are just beginning and will likely extend over the next several years. Some preliminary observations on these animals and their scientific context follow:

Rhyncholestes raphanurus. Discovered and named by a previous Field Museum expedition, the "Chilean shrew opossum" was previously known by only four specimens. This family of American marsupials was widely distributed and diverse during the early "Age of Mammals" (15-50 million years ago), but is now represented by only three kinds restricted to temperate forests in the northern Andes of Ecuador and Columbia, in Peru, and in southern Chile. At La Picada we collected 24 of these animals, determining for the first time their chromosomal complement (now in press in *Fieldiana: Zoology*), their reproductive season, and their surprisingly broad ecological distribution (from 425 to 1,135 m elevation). They appear to be exclusively terrestrial, foraging on the ground, alongside logs, and in dense cover for insects and invertebrates.

Dromiciops australis (*monito del monte*, or "little

Rhyncholestes *Osgood, a long-nosed, insect-eating marsupial, was surprisingly abundant in forests at La Picada. Short fur and reduced eyes and ears are adaptations to foraging on the ground and in leaf litter. Its peculiar "smile" is formed by a pair of lip flaps whose function is unknown. Photo by B. D. Patterson.*

Mouth of small river near camp on Isla Gran Guaiteca, at northern end of the Guaitecas Archipelago, where collecting was done in 1984. Photo by B. D. Patterson.

monkey of the forest"). This marsupial is also poorly known, and like the shrew opossum, is limited in distribution to the south temperate rain forests. Its evolutionary relationships are unclear, and there are persistent suggestions that it is more closely related to Australian forms (including kangaroos and wombats) than to other American opossums. Interestingly, the results of our chromosomal studies have uncovered a peculiar form of chromosome variation in *Dromiciops* known as "sex-chromosome mosaicism." One of the 14 chromosomes in males (presumably the Y, or male-determining, chromosome) is lost in body cells but retained in the germ line that is used in reproduction. Unknown in other American marsupials, sex-chromosome mosaicism is widespread among Australian forms, including gliders and bandicoots, providing additional support for its being "the Australian Connection." Five *Dromiciops* we captured alive at La Picada have been donated to Chicago's Brookfield Zoo, the only zoo outside Chile to have ever exhibited this *family* of mammals! Studies of these captives (especially of behavior and its possibly unique form of torpor/hibernation) may shed additional light on studies now underway at Field Museum on their anatomy, ecology, and evolutionary relationships.

The remaining animals we captured are all rodents distantly related to deermice that probably colonized South America no earlier than 8 to 10 million years ago. Since then this group has literally exploded into a vast number of ecological niches and named kinds. However, their mostly incipient adaptations (versus the older and better defined ones found in North American rodents, for example) have clouded our understanding of their relationships.

Adult female Dromiciops, *showing pouch (lined by rusty fur) and four nipples. Our sample of the valley took place after the reproduction season of this species. Photo by B. D. Patterson.*

The "mole mouse" (*Geoxus valdivianus*) lives in forest litter, where it feeds chiefly on insects and other invertebrates. The reduced size of the eyes and

Golfo Corcovado from our campsite on Isla Gunther in the Guaitecas Archipelago. Snow-capped Andes, 85 km distant, loom on the horizon. Photo by B. D. Patterson.

ears, enlarged fore claws, and the sheen and texture of its pelage all suggest radical convergence on the true moles, a northern group of insectivores. However, the skull and teeth (which provide good "taxonomic" characters because they are conservative) of *Geoxus* are scarcely modified from its less-derived ancestors. Another rodent restricted to temperate forests in this region, the Chilean tree mouse (*Irenomys tarsalis*) apparently lives in the canopies of gigantic trees on a diet that includes pollen and flowers. Although it has the enlarged eyes, tail, and feet that are often associated with arboreal life, it lacks many other specializations (such as a prehensile tail or toes). A terrestrial leaf-eating rodent (*Auliscomys micropus*) was taken in the five upper lines but was absent in the two lower ones, suggesting that, at this latitude at least, it is exclusively Andean or montane.

Two other taxa, the rice rats (*Oryzomys longicaudatus*) and the vole-like olive akodon (*Akodon olivaceus*) were captured at more or less equal frequencies throughout our altitudinal transect. This is very interesting for it may explain the fact that, of all the species found at La Picada, these two have the broadest geographic distributions. In this case, broad ecological tolerances evident at La Picada (both were found at all elevations) may signify the same ecological amplitude that allows these species to live in drier scrub habitats in northern Chile and in colder, wetter habitats to the south.

But in many ways, the most interesting situation we discovered at La Picada was that involving two other kinds of akodon, namely the long-haired akodon (*Akodon longipilis*) and Sanborn's akodon (*Akodon sanborni*). When geographically isolated from one another, these two mice are grossly different, *longipilis* being a larger, red-backed mouse, *sanborni* being a small, uniformly blackish mouse. However, where the two come together, as at La Picada, mice of intermediate appearance are found, leading to the conclusion that the two interbreed and that these intermediate-appearing forms are hybrids. At La Picada, Sanborn's akodon was centered in the coastal rain forests at lower elevations and the long-haired akodon was found principally at higher elevations. The two overlapped at intermediate elevations, where we captured about 40 presumed hybrids.

Sunset at the Refugio. Cloud bank visible at lower elevations accounts for lushness of lower elevation forests. Photo by B. D. Patterson.

Interestingly, hybrids were taken in forest ecotones (that is, areas where two different habitat types grade into one another). If we can understand the relationships between these two mice, using their genetic, ecological, and anatomical relationships to one another, it may be possible to attain a fuller understanding of speciation (species formation) in this diverse group of rodents. These studies are now underway, both at Field Museum and Universidad Austral.

The majority of our data is not yet analyzed, but the preliminary results are now being used in a proposal to the National Science Foundation to fund two additional altitudinal transects in southern Chile. Together, the three transects should not only illuminate the microgeographic distributions of the species, the foods they eat, and their life-history parameters, but also indicate the spatial and temporal stability of the relationships we studied in 1984 at La Picada. The issue of stability is important to understanding the generality of the results we obtained.

The study we conducted at La Picada represents a carefully designed approach to thè evolutionary ecology of a poorly understood group of mammals. It should yield a gold mine of information on genetic relationships, distributional patterns, food habits, and life histories, and should provide insight into the process of speciation in the diverse genus *Akodon*. Nevertheless, the design was "jury-rigged," with questions, approaches, and personnel borrowed from its immediate scientific context (*i.e.*, Meserve's and my field programs). It therefore underscores the impromptu nature of the scientific method and the serendipitous nature of its conduct. Most scientists recognize that, when walking through a dark forest, it's best to keep one's eyes (and options) open. FM

Hawaiian Quilt-Making At Its Finest

The superb cotton quilt (cat. 259778) on this issue's cover exhibits the finest skills of Hawaiian quilt-makers at the turn of this century. This piece was probably made before 1918.

People in the South Pacific in ancient times made native cloth (*tapa* or *kapa*) out of the inner bark of certain kinds of trees. By the end of the nineteenth century, however, both the art and the craft of making bark cloth had died out on many of the Pacific islands.

During the last century, women on the islands now included in the modern state of Hawaii gave up making their own fabric out of trees and began using imported cotton fabrics. They adopted foreign crafts, too. One of these was quilting, an art introduced by the wives of missionaries.

Stitching that "follows the pattern," exemplified in this piece, is a hallmark of the finest quilts from our island state. The colors of this piece, purchased by Field Museum in 1984, are the royal colors of the former kingdom of Hawaii, and the design is *pua miulana,* "miulana flower."

The engraving of the miulana shown here is reproduced from volume I of *Hortus Malabaricus,* a 12-volume work by Hendrik Adriaan van Rheede. The set, published in Amsterdam and completed in 1693, was purchased by Field Museum in 1942 and is now in the Mary W. Runnells Rare Book Room.

Miulana, a native of the forests of the eastern Himalayas, was named *Michelia champaca* by Linnaeus in 1753. Also called champaca, or sampacca, it is known throughout the tropics only as a cultivated tree. The name *champaca* is derived from Ciampa, an island between Cambodia and South Vietnam, while *Michelia* honors Pietro Antonio Micheli, a Florentine botanist who died in 1737.

The Hawaiian name *pua miulana mele-mele* (literally "flower, mulang tree, yellow-yellow — or very yellow") refers to the *Michelia* that has orange or yellow flowers, about two inches in diameter, with 15 to 20 sepals and petals. The flowers are exceedingly fragrant, especially at night. They bloom most of the year in the tropics and are often mentioned in East Indian poetry. The Hindus dedicate the plant to their god Vishnu, while Indian Buddhists esteem the tree and make images of Buddha and bead chains of the wood. The flowers are worn as garlands in the hair, are strung into necklaces, and are used in making perfume. The seeds, bark, and leaves are used in medicines.FM

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Information for this article was provided by William E. Grime, Department of Botany; John E. Terrell, Department of Anthropology; and Benjamin W. Williams, Library.

What Is Jade?

A Question for the Archaeologist As Well as the Mineralogist

by Edward J. Olsen
Curator of Mineralogy

When questions regarding jade are presented to a mineralogist, a number of problems come up. Probably the most common question is the one of authenticity. The truth is, whether a given piece of jade is truly jade is not a mineralogical question but a question of archaeological definition. Because the term *jade* is not a mineralogical word and does not have a precise mineralogical definition, the mineralogist is willing to accept anything the archaeologist defines as jade on the basis of whatever archaeological standards he chooses to use. Thus, as a whimsical example, if archaeological study were to turn up the heretofore unrecorded fact that the craftsmen of China have, for ten centuries, regarded carved green soap with the same high esteem as carved green rocks, and the Chinese refer to both with the same word *yü* (jade), then by archaeological definition the green soap is jade also. To the mineralogist it doesn't matter what archaeologists accept as jade, but the fact that they accept a good deal of different mineralogical material as jade makes it hard for the mineralogist who is attempting to ferret out fakes.

The materials accepted as jade are not minerals in the strict sense, but rocks. A rock is an aggregation of grains of one or more minerals. For tens of centuries the finest Chinese jade consisted of a type of rock that is made up *almost entirely* of grains of the mineral *actinolite*. Actinolite characteristically occurs in the form of needle-shaped grains. When these are microscopically small and tightly interlocked, then the actinolite rock is called *jade*. The mineral actinolite varies somewhat in its chemical composition: when it contains a moderate amount of iron, its color is medium to dark green; when it is completely free of iron, it is white. The special mineralogical name for iron-free actinolite is *tremolite;* the whole range is called the tremolite-actinolite series. Thus, this rock can range in color from dark green to white. Archaeologists accept this range of colors in these rocks as jade.

It is rare for an actinolite rock to consist entirely

Jade Seminar

May 17 and 18

In this seminar, jointly sponsored by Field Museum and the Gemological Institute of America, the gemological properties of jade will be discussed as well as its legend and lore. Factors important in evaluating jade and in recognizing jade simulants will also be covered. The Hall of Chinese Jades will be open for study during the reception for instructors and participants, on Friday, May 17, from 6 to 8 pm. The seminar, on Saturday, May 18, will begin at 9am and end at 5pm. Cost of the seminar, which includes reception, lunch, and a comprehensive notebook developed by GIA, is $95 (no member discount).

Seminar instructors are Betty Parker Simpson, a silversmith and jewelry design instructor; and Jill W. Walker, a gemologist with the Gemological Institute of America.

Registration for the seminar may be made by sending a check or money order (payable to Field Museum) for the seminar fee to Adult Education Programs, Field Museum, Roosevelt Road at Lake Shore Dr., Chicago, Il 60605. Additional information may be obtained by writing the Museum or by phoning (312) 322-8855.

This article is adapted from "Is It Really Jade Or Not?" by Dr. Olsen, published several years ago in the Bulletin.

Photo taken in China in the early years of this century shows two jade cutters at the time-consuming process of slicing through a large block of this hard material.

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of grains of only the one mineral. It commonly has grains of black magnetite, white quartz, white feldspar, white calcite, and even small amounts of green micalike minerals. Some of the finest jade carvings show black streaks of magnetite in them. The question arises, how much of what impurities will be tolerated and still permit a designation as jade? The answer to this is clearly an arbitrary matter of taste, esthetics, and tradition.

Since this form of jade is comprised of microscopic interlocking needles of actinolite (or tremolite), what does one do when the needles are so large they are no longer microscopic? What does one call a pure actinolite rock in which the green needles are an eighth of an inch long and clearly visible? If a fine-grained actinolite rock is jade, why not a coarser-grained one? Again, it is a matter of tradition and aesthetics. In both these cases, impurities and grain-size, the mineralogist can't offer an answer.

About two centuries ago a new source of attractive green rock (also sometimes gray, or even blue) was discovered close to China in Burma. It was hard like jade, usually green like jade, and could be worked into pleasing carvings. Archaeological usage caused it to enter the ranks as jade. Mineralogically, however, this material is an entirely different rock, one composed of interlocking microscopic grains of a different mineral called *jadeite*. In fact, the mineral got its name because of the use of the rock as jade. This rock also possesses problems about acceptable impurities and size of mineral grains. Thus, two materials are accepted, by archaeological definition, as jade. In the jade business these are usually distinguished by modifying words. The original actinolite rock is referred to as *nephrite jade*, and the jadeite rock as *jadeite jade*. The buyer of an object advertised as jade does not usually know which type he is getting. Both are jade; the value depends mostly on the age of the piece, craftsmanship, size, and archaeological factors. In general, the majority of pieces one sees sold are made from nephrite jade simply because it is a vastly more abundant rock type than jadeite rock in the earth's crust.

If only these two kinds of rocks were ever worked as jade, mineralogical problems would be limited to those mentioned earlier. But native craftsmen over the centuries have, unfortunately, not always been discriminating in their choices of materials. A large variety of other rocks and minerals have also been utilized: such green rocks as serpentinite, meta-

morphosed basaltic lavas (called greenstone), soapstone, hard clays; and actual single minerals as green chalcedony and uvarovite garnet have shown up in some old collections. In some cases the craftsmen may have had it in mind to defraud; however, in most instances lack of knowledge or lack of discrimination led to the use of any workable attractive green rock or mineral that would take a good polish. In more recent times dyed glass has been used to simulate jade in an obvious attempt to defraud. Frequently even the seller is unaware he is selling glass. A fairly common practice in costume jewelry is to mix the pieces with part of the object made of jade (usually nephrite) and part of it made from glass, soapstone, or serpentine chosen (or dyed) to provide closely matched color. Thus, such a piece can be sold as "jade" which lies just inside the border of the truth.

For a mineralogist to pass on the authenticity of a particular piece, it comes down to determining if it consists mainly of actinolite or of jadeite. The first simple test is to scratch it with a common steel needle. Neither material can be scratched; however, "look-alikes" such as serpentine, soapstone, and greenstone are readily scratched. Unfortunately, chalcedony and hard lead glass are not scratched. These can be distinguished from jades by optical tests. A severe limitation in applying such a test is that it is usually not possible to obtain a chip of a specimen to work on. A valuable carving cannot be sampled in a cavalier manner with hammer and chisel. It is usually necessary to sample from down inside a carved hole or depression, or on some inconspicuous spot on the bottom of the object, if it has a bottom surface at all. Frequently, especially with small objects, the piece is fully polished on all sides and a sample removed from anywhere will ruin its appearance.

As a general practice the quickest and safest method is X-ray diffraction. This method is based on the fact that each kind of mineral has a characteristic chemical composition and the atoms of the chemical elements are arranged in regular three-dimensional symmetrical patterns. X-rays passing through such a three-dimensional network are diverted into patterns of rays that reflect the characteristic arrangement of the atoms in the mineral. Each mineral has, in a sense, an X-ray "fingerprint" which permits its definite identification. For large objects, a minute amount can be scratched from an inconspicuous spot and mounted for X-raying. Small objects often can be fitted directly into the X-ray sample holder and X-rayed as a whole, unscathed. Thus the real jades and the "look alikes" can be readily distinguished.

It would appear that the X-ray method solves many problems. Unfortunately, archaeological acceptance makes for other difficulties. Long ago Chinese noblemen frequently had nephrite jade objects buried with them in their tombs. Soil acids and moisture acted slowly on these objects to gradually alter their composition and form different minerals of them. This alteration may form only over the outside as a coating, or it may completely work its way through an object, especially if it is small. When such pieces were dug up, centuries later, they were found to be quite pleasing in appearance. They had become an off-white color and resembled polished bone material. These objects became prized and it is logical that someone should experiment in an attempt to learn how to speed up this slow alteration process. It was soon discovered that nephrite jade could be converted to this appearance if it were subjected to intense heating. Today both of these forms of *bone jade* are accepted as jade; however, neither one is nephrite jade any longer. Depending on the process, long-term burial or short-term heating, two different rocks made of several entirely different minerals result. They are, nevertheless, considered to be jades also.

These altered materials complicate matters. Both consist of mixtures of several minerals in varying proportions depending on such factors as temperature and time. It is not possible to distinguish these rocks formed by the alteration of original jade from the same kind of rocks formed by other processes out of original material that was not jade at all. Thus, for these materials archaeological definition generally confounds mineralogical determination.

The authentication of jade is clearly not as straightforward as one might imagine. For the majority of cases X-raying provides a simple and relatively nondestructive method. In a small number of cases the final decision will depend on what the archaeologist is willing to accept. Probably the only other material that raises even more difficult minerological questions regarding authenticity is amber. It is regrettable that once man attaches monetary value to a mineral or rock, problems are created that go outside the realm of the mineral kingdom. FM

TOURS FOR MEMBERS

Ecuador and The Galapagos Islands

May 27-June 11

The Galapagos Islands affect our imagination like no other place on earth. To set foot on these remote islands is to return to a primeval land isolated and protected for millions of years. A distance of 600 miles off the coast of Ecuador are these lost specks of volcanic land on which nature evolved a separate microcosm of animals and plants.

Our tour will begin with a visit in the host country of Ecuador, which offers an opportunity to enjoy the charm of Old World ambience, along with the color and distinction of the centuries-old Indian market villages of Lactacunga and Ambato.

To enhance your learning experience on this tour, Dr. Glen E. Woolfenden, research associate at Field Museum, and professor of zoology at University of South Florida, will be our leader and will accompany the group from Miami and return.

This is our exciting itinerary:

May 27: Fly from Chicago O'Hare airport to Quito via Miami.

May 28: Tour the city of Quito, visit the fabulous Archeological Museum, view the church of San Augustin and Museum of Colonial Art.

May 29: Visit the art galleries of the painters Guayasamin and Viteri; tour the Olga Fish Folklore Gallery. In the afternoon visit the Equatorial Monument. Also, visit the Indian villages of Pomasqui and San Antonio and the crater of Pululahua.

May 30: Full-day excursion over the Andes' western ridge, down into the coastal jungles with their banana, cocoa, and coffee plantations and see the village of the Colorado Indians, colorful in dress and custom.

May 31: Full day of birding in the area of Papallacta. Ecuador is home to more than 1,400 species of birds.

June 1: Morning departure by bus to the Latacunga-Ambato Valley stopping at Latacunga Indian market and the Cotopaxi volcano, where we will visit a small museum at the base of the volcano, and on to Ambato with its huge market.

June 2: Leave the frosty Andean heights, travel across a fertile plain and past highland villages, via Riobamba and Devil's Nose pass to Guayaquil, Ecuador's chief port, where we'll stay overnight.

June 3: A morning flight to Baltra, where we will board the MV *Santa Cruz*. Comfort is indeed the keynote for our life aboard ship in both clothes and atmosphere, with casual attire recommended. Tonight and each evening during the cruise we have a slide presentation and a lecture outlining the next day's highlights.

June 4: The first island we see is Bartolome, site of Pinnacle Rock, the most widely recognized landmark in the Galapagos. Later we cruise in Darwin Bay. Tower island is considered one of the most complete bird islands, with virtually millions of sea and land birds resident to its shores.

June 5: Cruising Isabela and Fernandina Islands, entering Tagus Cover in the morning.

June 6: Cruising Baltra and North Seymour Islands. After a brief stopover at Baltra, we cruise to North Seymour and will be transported to the rocky shore via small craft. Our first encounter, as we walk on the island, is with dense colonies of blue-footed boobies.

June 7: Cruising Hood and Floreana Islands. We follow the marked trails on Hood Island to search for its own species of mockingbird and its most spectacular part-time resident, the waved albatross. Along the way, we catch glimpses of masked boobies and several species of finch. We land at Punta Cormorant on Floreana Island and on an inland lagoon we'll see where multitudes of flamingos nest. Floreana's vegetation is particularly interesting.

June 8: Cruising Santa Cruz and Plaza Islands. Upon arrival at the village of Puerto Ayora on Santa Cruz we walk directly to the Darwin Research Station for a briefing. This afternoon, we call at tiny Plaza Island, where sea lions swim out to welcome us.

June 9: We land early in the morning on a beach of black lava sand on James Island, then hike to a tranquil crater lake where flamingos feed. Next we can swim with (or just observe) the fur seals in one of the pools cut into the cliffs by surf erosion. After lunch we cruise past unusual cinder cones and lava formations along the coast en route to Buccaneer Cove, the former refuge of pirate ships.

June 10: This morning we cruise to Baltra, disembarking in time to board our flight to Guayaquil. En route to the Oro Verde Hotel we will tour Guayaquil, seeing the Avenida Olmedo, city watchtower, government buildings, and the municipal museum. In the evening we'll enjoy a gala farewell dinner.

June 11: Return to Chicago via Miami. Early evening arrival at O'Hare.

Price per person (double occupancy): $3,545 for main deck cabins. Upgrade to upper deck: $150; upgrade to boat deck: $310. An extension to Peru is optional. The tour price includes land and cruise costs and round-trip economy air fare. The tour is limited to 25 people, and early reservations are recommended. A $500 deposit per person should be sent to Field Museum Tours.

Alaska and The Pribilof Islands

June 5-19

June 5: Fly from Chicago's O'Hare to Sitka. Welcome dinner.

June 6: City tour of Sitka. Marine wildlife motor raft trip with dinner on board cruise vessel.

June 7: Late morning flight to Juneau. Mendenhall River raft trip with lunch on board. Evening outdoor salmon bake.

June 8: Morning flight to Glacier Bay. Glacier Bay cruise aboard the MV *Glacier Bay Explorer*. Overnight on board ship.

June 9: After completing Galcier Bay cruise, afternoon flight to Fairbanks via Juneau.

June 10: Ride the Alaska Railroad to Denali National Park. Afternoon at leisure; salmon bake dinner and overnight at McKinley Chalets.

June 11: Full day tour to Kantisna. Return to McKinley Chalets for dinner and overnight.

June 12: Morning at leisure. Afternoon motorcoach trip to Anchorage.

June 13: Morning at leisure. Afternoon tour to Potter's Marsh Bird Refuge.

June 14: Morning at leisure. Afternoon Float Trip on Eagle River with dinner on board.

June 15: Flight to St. George Island.

June 16-17: Two full days exploring St. George Island.

June 18: Return flight to Anchorage. Farewell dinner.

June 19: After breakfast transfer to airport for return flight to Chicago.

Our leader will be Dr. John W. Fitzpatrick, associate curator and head of the Division of Birds at the Field Museum, where he also serves as curator-in-charge of Scientific Services and chairman of the Science Advisory Council. He is an experienced tour lecturer, most recently leading Field Museum tours to Ecuador and the Galapagos Islands, and to the Lesser Antilles.

Tour price: $4,625.00, based on double occupancy (includes round trip coach class air fare). We hope you can join us for this exceptional tour. A deposit of $500.00 per person will confirm your reservation.

ADDITIONAL TOURS FOR 1985

Grand Canyon Rafting Trip

May 24-June 2

China and Tibet

August 10-September 1

Kenya

September 6-23

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

Field Museum of Natural History
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The Art of Cameroon

March 9–June 16

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

May 1985

African Heritage Dancers and Drummers
Saturday, May 18

A Dance Collaboration: African Heritage Dancers & Drummers, Darlene Blackburn Dance Troupe, and Muntu Dance Theatre perform together
Sunday, May 19

Field Museum of Natural History Bulletin

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COVER

Monk parakeets (Myiopsitta monachus) *clustered about their large communal nest in Chicago's Hyde Park. Now in its fifth season, the colony of birds normally found in subtropical and temperate South America has prevailed, despite subzero weather and the nets of parakeet hunters. Photo by D. Walsten. For more on the monk parakeet see pp. 11-17.*

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Events

Festival of Masks

PERFORMANCES

"Masquerade of Cameroon and Abang: Rites of Passage Suite"

African Heritage Dancers and Drummers

Saturday, May 18, 3:00 pm
Stanley Field Hall, Second Floor

African Heritage Dancers and Drummers present an electrifying performance celebrating the ritual coming of age of a young Cameroon maiden, the cultural counterpart of the debutante's ball. In the traditional manner, a young maiden is shut away for a period of one year. There she is fattened—spiritually, mentally, and physically, in preparation for her future role as wife, mother, and productive member of her village. Our dance begins as the young girl is led out for the first time and the celebrations begin—a leopard, an idim ebok bird, and a turtle perform masquerades for the fon. Next, a group of dancing warriors appear, followed by the matriarchs. In a grand finale of explosive dance and music, a group of mirror-bearing amazon women accompany the maiden as she parades before her village, no longer a girl.

African Heritage Dancers and Drummers is one of the first black performing arts companies originating from the inner city of Washington, D.C. Begun in 1960 as a black community cultural awareness project and comprised of local people, it now includes performers from West Africa, the Caribbean, and South America.

"A Dance Collaboration"

African Heritage Dancers and Drummers
Darlene Blackburn Dance Troupe
Muntu Dance Theatre

Sunday, May 19, 1:00 pm
Stanley Field Hall, Second Floor

As a finale to our Festival of Masks, three dance companies present a spectacular collaboration of masking, dance, and music. Join us as Washington's African Heritage Dancers and Drummers, Chicago's Darlene Blackburn Dance Troupe, and Muntu Dance Theatre collaborate in a breathtaking dance piece. Then, each group presents its own dance interpretation. In "Mask Suite," the African Heritage Dancers and Drummers present a dogon funerary ceremony using a Serege mask to conduct prayers to the spirit world. Muntu Dance Theatre performs a piece from "The King's Dance" and the Darlene Blackburn Dancers present dances from West Africa. At the end of this celebration, the dancers invite the audience to participate in a dance from Ghana. Beginning in Stanley Field Hall, the dancers lead us through the Museum to our special exhibit of masks produced by children from Chicago area schools. Festival of Masks activities are free with museum admission.

DEMONSTRATION

"Masquerade and Mask Making"

African Heritage Dancers and Drummers

Saturday, May 18, 12:30-1:30 pm
Stanley Field Hall, Second Floor

The use of masks and costumes in the grassfields and forest areas of Cameroon is widespread. The making of these ceremonial objects forms part of the rich art

CONTINUED➪

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Events

tradition of Cameroon. Using traditional methods, members of the African Heritage Dancers and Drummers exhibit costumes and explain the difficult and complex procedures used to create these beautiful objects. Masks and costumes on display include leopard, dogon, and stilt walker, each of which will be used in their dance performance later that day.

Family Feature

MASK MAKING

Saturday and Sunday, May 18 and 19
12:00 noon-2:00 pm
Stanley Field Hall, Second Floor

Come to Field Museum's Festival of Masks in celebration of our exhibit, "The Art of Cameroon." When Africans from Cameroon wear masks in rituals and celebrations, they are only part of an entire costume known as a masquerade. The mask itself holds no special power until it is combined with a symbolic gown, the rhythm of the drums, and the dance. The mask puts the finishing touch on creating a personality or emotion for the dancer. After walking through the exhibit filled with Cameroon masks, find out how they are made. Make a mask that reflects your personality like the ones from Cameroon. Also, on Sunday, May 19, you can wear your mask and join in a dance celebration with the African Heritage Dancers and Drummers, the Darlene Blackburn Dance Troupe, and the Muntu Dance Theatre.

May Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

May

4 11:30 am. *Ancient Egypt* (tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

1:30 pm. *Tibet Today* (slide lecture). See Lhasa and other towns now open to the public.

2:30 pm. *Tibetan Tour* (tour). Take a trip through our Tibetan Hall.

5 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

12 1:00 pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

1:30 pm. *A Walk With China's Animals* (tour). Meet Su Lin the panda and other animals found in China, then meet imaginary and real beasts through Chinese art masterworks.

19 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

26 1:00 pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

These programs are free with museum admission and tickets are not required.

1. Memorial figure, Kongo, Zaire. Wood, pigment, 60cm. Museum purchase. Photo by Ron Testa. N109451.

African Art at The Field Museum

by Richard J. Powell

Like most natural history museums, Field Museum of Natural History features the ethnology of Native Americans, Pacific peoples, Asians, and Africans. Since the museum's inception in 1893, approximately 500,000 items of prehistoric, archaeological, and ethnological import have entered the collection. Though African artifacts account for only a small part — roughly 16,000 specimens—of the entire anthropological holdings at the Field Museum, this number represents several world-class collections of African material culture, as well as many individual objects of artistic merit.

With the tastes of African art connoisseurs in constant flux, and access to information about African traditions on a steady rise, African art collectors, scholars, and enthusiasts are increasingly turning to institutions like the Field Museum, where relatively unknown, yet important African objects have long been viewed from a largely anthropological, rather than aesthetic, perspective. Serious scholars of Africa, especially those with an interest in the material culture of Nigeria, Cameroon, Congo, Zaire, Angola, Kenya, and the Malagasy Republic, have usually found researching the Field's corresponding collection to be a worthwhile endeavor. What today's art-oriented visitors are discovering is that the museum offers a wealth of African artistry as well as anthropology, and that both work together in establishing a total setting for the collection.

The first African acquisition for the Field Museum's

"African Art at the Field Museum" originally appeared in African Arts, *Vol. XVIII, No. 2 (February 1985),* *copyright © 1985 by the Regents of the University of California.*

2. Fragment of a medicine staff (osum ematon). Benin, Nigeria. Iron, 67cm. Museum purchase. Cat. 89835. N99373.

ethnological collection came about as a result of transferring objects from the World's Columbian Exposition to the newly incorporated Columbian Museum of Chicago in 1893. Frederick W. Putnam, curator of the Peabody Museum and professor of anthropology at Harvard University, was the primary catalyst in developing the anthropological exhibits for the World's Columbian Exposition. Putnam, along with assistants Franz Boas and George A. Dorsey, enlisted the help of several American and European collectors in assembling materials for exhibition. One of their European contacts, collector Carl Hagenbeck of Hamburg, Germany, eventually sold his ethnographic collection to the newly formed museum.[1] Among the many fine artifacts that the Columbian Museum purchased from Hagenbeck is a Kongo carving of a seated man (fig. 1). This cross-legged and tankard-carrying image subscribes to a category of commemorative sculptures that remind the living of their still-influential ancestors. As with other sepulchral figures by Kong artisans, the white pigment on this depiction of an important man refers to his place in the world of the dead, rather than to race (Laman 1957: 96, pl. 2).

In a reorganization of the trustees in 1894, the museum was renamed the Field Columbian Museum, after Marshall Field, the head of a major retail business in Chicago and one of its leading citizens. Under the aegis of the trustees and George A. Dorsey, chief curator of anthropology from 1896 to 1915, several groups of objects from the court of Benin entered the collection of the Field Columbian Museum. Included in the first Benin acquisition is an elegant memorial head of a queen mother (fig. 3). Distinguishing traits like the four keloids above each eye, inlaid strips of iron on the forehead, a single coral cluster on each side of the head, and a flanged base decorated with a low-relief guilloche design tentatively date this commemorative head and tusk stand to the first half of the eighteenth century. The head was purchased from H. O. Forbes, director of the City of Liverpool's Public Museums and one of the first scholars

3. Memorial head of a queen mother. Benin, Nigeria. Cast brass, 42.5cm. Museum purchase. Cat. 8262. Photo by Diane Alexander-White. N109487.

to make a serious study of Benin art. The 1899 acquisition date for this Benin masterpiece makes the Field Columbian Museum one of the first American institutions to obtain art examples from this area following the highly publicized British punitive expedition into the kingdom of Benin in 1897.

This purchase was followed by other Benin acquisitions in the years 1902 through 1907. During this period, London-based dealer W. D. Webster was the source for several Chicago-destined Benin objects, among them the upper portion of a diviner's/healer's iron staff (fig. 2). Chameleons, ibislike birds, and miniature blacksmith's tools are the iconographic elements on this wrought-iron insignia. As with many of the iron staffs by the neighboring Yoruba peoples, this partial Benin staff features birds and iron implements in a larger statement on the complex relationship between righteous and malevolent forces in the universe (Thompson 1975: 56-59; Rebora 1983: 30-32).

An oath-taking figure from the Chiloango River area of lower Zaire (fig. 5) was one of the more important purchases from W. D. Webster's sale of 1907. Of the dozen or so large, so-called Kongo nail fetishes in collections throughout Europe and the United States, the Field Museum's *nkisi nkondi* is one of the most striking and well preserved. Beyond the figure's near-intact resin beard and raffia skirt, it is host to a large number of blades, nails, screws, and machine parts. Since each piece of metal represents an important matter that was resolved by hammering staves into its body, arms, and shoulders, the aggregate record of literally hundreds of legal and ethical disputes attests to this particular *nkisi nkondi*'s powerful role as arbitrator, notary, and law enforcer among the Yombe people (Bassani 1977: 38-39; Thompson 1978: 214-16). These factors, combined with a tour-de-force conceptualization of this figure, make it certainly one of the finest examples of a sculpted Kongo charm in a museum collection today.

Besides Benin and Kongo, other African cultures were represented in early acquisitions for the museum. In 1905, the newly renamed Field Museum of Natural History purchased a collection of approximately 200 objects from the Togo hinterland. The former owner of these ethnological specimens was Otto Finsch, director of the Brunswick City Museum. Finsch had received the artifacts several years earlier from Captain Thierry, an administrative officer in the former German colony of Togo.[2] A few of the textiles in this collection, especially an embroidered apron that was collected among the Moba people of northwest Togo (fig. 4), reflect the pervasive stamp of Hausa design sensibilities on local

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4. Apron. Moba (?), Togo. Dyed and embroidered cotton, 53cm x 60cm. Museum purchase. Cat. 104865. Photo by Diane Alexander-White. N109450.

artisans.[3] This region's position on the East-West trade route and the resultant cultural congress of various Voltaic, Manding, and Sudanic peoples make an exact identification of this textile problematic, but its V-shaped opening on the centralized pocket, as well as its general form, link it to the more traditional genre of Voltaic fashion (Froelich 1963: 133-34).

The African collection added 500-odd artifacts from the Kenya highlands in 1907. These objects were the bounty of a successful expedition into that area by Field Museum taxidermist Carl E. Akeley. Figuring prominently in this acquisition are some strong examples of Kikuyu culture, represented here by two dance shields (fig. 7) for male initiates. As part of the initiate's ceremonial costume, these shields, or *ndome*, are worn on the left arm of the decorated boy and incorporated into a panoply of movement, sound, and visual expression. Painted designs in red, black, and white appear on the outer sides of the shields, with contrasting patterns usually converging on a central, oval opening. The inner sides are equally graphic, consisting of engraved chevrons and zigzags that echo the op artlike body painting on the initiates (Routledge 1910: 154-57, pls. 82-85, 104, 106a, 107-9; Leakey 1977: 335-36, 406-10).

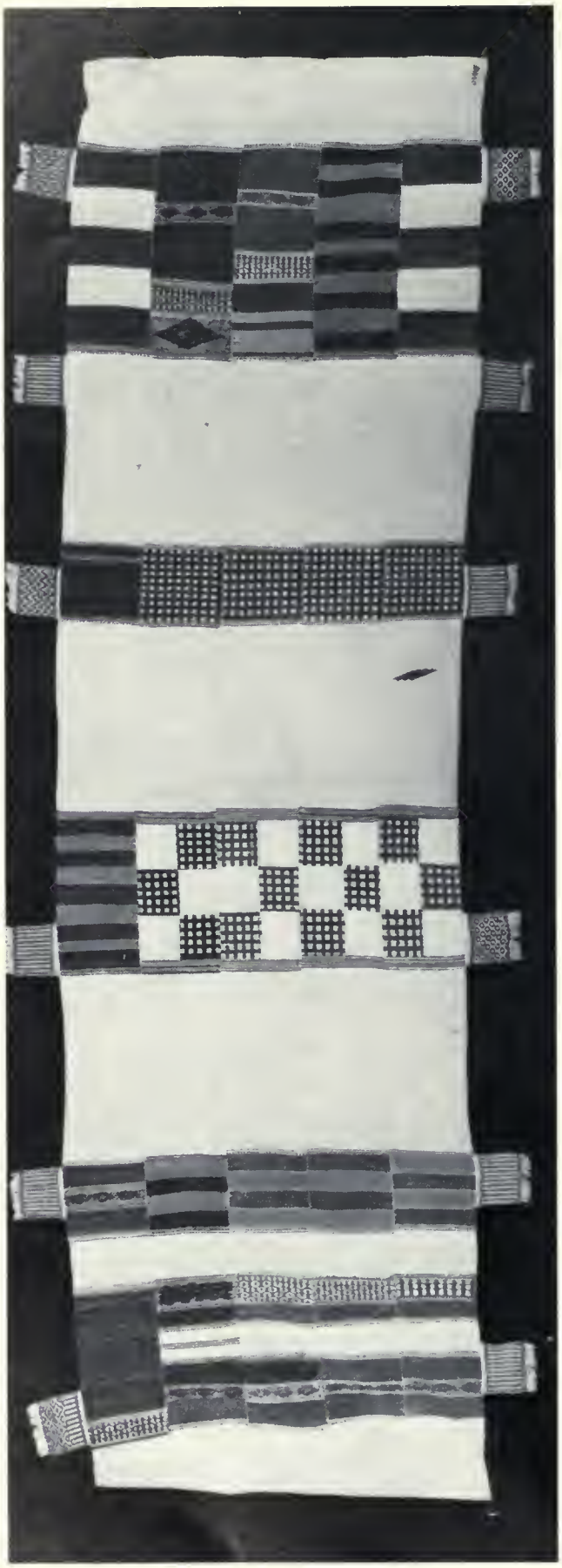
Chief Curator George A. Dorsey was succeeded by Berthold Laufer, a University of Leipzig-trained anthropologist, whose expertise was Asiatic ethnology. Under Laufer's leadership (1915-34), the Department of Anthropology continued a steady expansion of its African holdings through expeditions, purchases, exchanges, and gifts. Although the receipt of gifts can often be an unpredictable transaction for a museum, one early gift-accession to the Field Museum proved to be especially important to the collection. Included in this 1915 gift is an outstanding example of Ibibio dance headgear (fig. 8). White, yellow, black, and red pigments cover the small, placid face and wooden "flaps" of this masked representation of a good ancestor, or *mfon ekpo* (Messenger 1973: 121-23). For many years listed as originating in Congo, this eastern Nigerian mask came to the Field via Jamaica, probably the memento of a turn-of-the-century British colonial administrator.

The next major African acquisition took place ten years later, with the purchase of approximately 1,800 ceremonial objects, household furnishings, weapons, tools, architectural elements, clothing, and other items from New York dealer Jan Klegkamp. Klegkamp acted as an intermediary for the Museum Umlauff, a distribution house in Hamburg that supplied many German ethnographic museums with specimens.[4] The Field's purchase consisted predominantly of Cameroon artifacts, covering the entire range of art-producing areas. An enormous helmet crest (fig. 11), depicting a human face with inflated cheeks and balancing six long-tailed serpents on its head, is one of many western Grassfields masquerade costumes that came to the museum in 1925.[5] Acquired along with this helmet crest, but hailing from the coastal region of Cameroon, is the well-known Duala canoe model with prow ornament (fig. 9). Like similar works in other American and German collections, the juxtaposing of regimented rowers with undulating water creatures poses some provocative questions concerning myth, narrative, and history among the Duala. Unfortunately, the actual use and symbolism of these fantastic configurations remain, at best, speculative (Northern 1984: 179).

In addition to the art and material culture of southern forests, grassfields, and northern Cameroon peoples, this 1925 purchase encompassed artifacts from such peripheral areas as the Cross River region and the southern Cameroon/northern Gabon border. A spectacularly coiffured human head (fig. 16), conceived in the naturalistic style of Nigerian artists from the lower Cross River town of Calabar, is one of the many skin-covered headcrests accessioned that year. This particular crest, for a society of selected men in the community (Nicklin 1974: 14-15), is decorated with facial tattoos, raised circles or "targets" on its temple, and unusual down-curved braids.

Representing an altogether different part of Came-

5. Oath-taking figure (nkisi nkondi). *Yombe, Zaire. Wood, clay, fiber, metal, pigment, cowrie shell, 113cm. Museum purchase. Cat. 91300. Photo by Diane Alexander-White. N109327.*



roon's artistic heritage at the museum is a huge snake (fig. 12) carved out of a massive log and painted black and white. Leon Siroto, an authority on the art of western equatorial Africa and a former Field Museum curator of African Ethnology, identifies this object as part of a larger initiatory sculpture grouping made by the Eton people, a subgroup within the Beti-Bulu cultural network of southern Cameroon (Siroto 1977: 40-41).[6] Parallels between this snake and one at the Museum für Völkerkunde in Munich again illustrate the Field's close connection to German collections and collectors.

A Hemba-allied ancestor sculpture (fig. 10) and a woven Mende hammock (fig. 6) were two gifts that complemented existing Field Museum specimens during the 1920s. The three locks of hair on the beard, the uncharacteristic, open-eyed expression, and the flat, wide feet on the male ancestor stylistically place it between the Songye territory and the area immediately west of Lake Tanganyika in southeastern Zaire.[7] John Quinn, the celebrated American collector of early twentieth-century modern art, once owned this figure. It was purchased from his estate auction in 1926 by the Arts Club of Chicago, which in turn gave it to the Field. The Mende hammock came into the collection in 1929 as a gift from a Chicagoan who had received the textile from her collecting father at the turn of the century. The trademark of these prestigious, Sierra Leonean-made country cloths is the corresponding and contrasting pattern, manipulated by the weaver via natural and dyed yarns, weft-faced weaves, and supplementary tapestry techniques (Easmon 1924: 16-24).

The ever-growing African collection in the 1920s created a place on the museum staff for an African specialist. This curatorial vacancy was filled by Ralph Linton and Wilfred D. Hambly. Although Linton was a curator of Oceanic ethnology from 1926 until 1929, his interest in the Malaysian-influenced African island of Madagascar led him to become the first full-time curator of African Ethnology in 1926, specializing in the physical anthropology and ethnology of Angola and Nigeria.

Both Linton and Hambly headed museum-sponsored expeditions in their respective parts of the world, bringing back with them a variety of objects that illuminate aspects of African society circa 1920. Hambly's 1929 expedition to Angola yielded for the museum one of the largest American-based collections of ethnological specimens from that country (Hambly 1934:86).

Continued on page 18

6. Hammock (kpokpoi). *Mende, Sierra Leone. Natural and dyed cotton, 70cm x 234cm. Gift of Mrs. William G. Burt. Cat. 175957. Photo by Fleur Hales Testa. N109216.*

Chicago's monk parakeets at their communal nest.

Chicago's Parakeets

After Five Years' Residence The Colony of South American Birds Is Still Hanging in There

by David M. Walsten

photos by the author

While golfing on Chicago's Jackson Park course in 1981 I heard for the first time of the city's resident parakeets. On that July afternoon my golfing partner mentioned having seen green parrots on several occasions swooping over the fairway. I may have been tempted to enquire if these bizarre sightings occurred as he was winding up 18 holes under a blistering sun; in any case, I forgot about his observation until two years later, when I happened to see the gigantic nest built by these birds in Hyde Park, about a mile north of the golf course. The nest was hard to miss, since it looked every bit like a miniature hay stack that had been flung into the green ash tree by some capricious tornado. Eight or ten of the stunningly beautiful birds were clustered about the communal nest, chattering and muttering contentedly to themselves and disporting their bright green plumage like fashion queens in the afternoon sun. For one who had been a nonbeliever until then, it was an unforgettable experience.

The Hyde Park assemblage of monk parakeets

(*Myiopsitta monachus*), I learned, had first been sighted in the area in February 1980, when they were reportedly trying to establish a nest on an apartment building fire escape.* Had these birds been of a quiet disposition they might have remained unmolested, but their strident chatter earned them an eviction even before settling in.

the birds were imported into the U.S. in 1983; 10,807 was the preliminary figure for 1984. Its occurrence in Chicago and other North American locations may be explained by the occasional release of these birds, accidental and otherwise, from homes where they have been kept as pets or while in shipment.

Skins of the monk parakeet, Myiopsitta monachus, *in the Field Museum collection. These specimens were obtained in Argentina in the 1920s—long before the bird was seen in the wild in the United States. The Specimen at top is about 11 inches in length. The sexes are outwardly alike.*

It was then that they flew a few blocks north to build in the green ash tree.

Known in the pet trade variously as the quaker, gray-headed, or gray-breasted parakeet, the species is native to the subtropical and temperate zones of South America, where it occurs in Bolivia, Uruguay, Paraguay, southern Brazil, and in Argentina as far south as 40° S latitude (the Southern Hemisphere equivalent of Philadelphia, Denver, and Champagne-Urbana). In the United States it is favored as a cage bird, despite its noisy chatter (at least one Chicago pet dealer, however, refuses to carry the species because of its raucous nature). According to the U.S. Fish and Wildlife Service, 9,308 of

Since first being reported in the wild in the United States about 18 years ago, the monk parakeet has sometimes given the impression that it would settle into a permanent, breeding status, only to disappear after a season or two. Some observers believe that it can and will fill that ecological void left by the closely related Carolina parakeet, now extinct, which occurred solely in the United States.

(Another competitor for the Carolina's niche may be the evening grosbeak. Norman L. Brunswig, Stephen G. Winton, and Paul B. Hamel in a recent issue of *Wilson Bulletin,* speculate that the gradually expanding winter range of the evening grosbeak may be in part attributable to the disappearance of the Carolina parakeet. Only these two birds, they suggest, have or had the ability to crack open very hard items such as cones of the bald cypress and pond cypress, which occur in the Seaboard

**In the early 1970s monk parakeets were reliably reported in the city's southeast suburbs.*

states and, in the case of the latter, westward to Texas and up the Mississippi Valley to Illinois—areas where the Carolina parakeet was prevalent.)

The monk parakeet is about 11½ inches long, nearly half of this being tail. The back is bright green or gray-green, the tail green and blue. The upper belly is a soft yellow, the head and breast grayish. (It is for this grayish pattern, presumably, that the sobriquet "monk" was applied.) The wings are mostly blue. The mature bird weighs about five ounces; coloration and size appear identical for both sexes.

Among all the known species in the parrot family, numbering well over 300, the monk parakeet is the only builder of such a nest: an irregular-shaped stack of twigs which may be as large as 15 to 20 cubic feet in mass and weigh several hundred pounds. In South America the birds seem to favor thorny trees (particularly the tala, *Celtis spinosa*) for the nest, but they are commonly constructed on manmade structures such as telephone or utility poles, under eaves, or on window ledges. Eight of the nests have been found in a single tree. Some huge parakeet nests in Argentina have been used by continuing communities for decades. A dozen pairs may breed in a single nest, each with its own compartment. The nest is used all year round and damaged sections are repaired at the approach of the breeding season. The entrances are generally protected by overhanging twig masses, thought to provide protection against opposums, which sometimes live in the upper compartments. Other species that make this unusual type of nest are the palm chat of Haiti and Santo Domingo, the buffalo weaver of subsaharan Africa, and the sociable weaver of southwestern Africa.

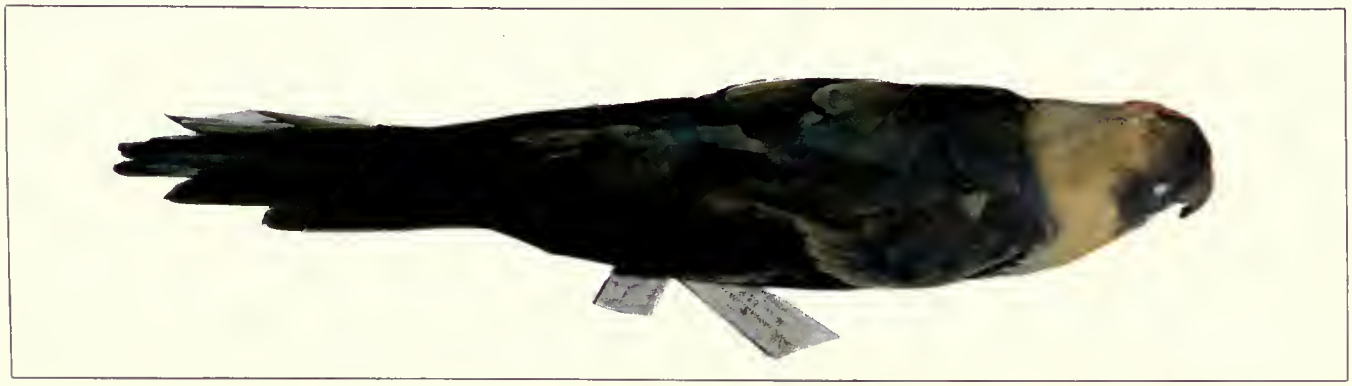
The individual nesting compartment is about 18 cm (about 7 inches) in diameter and the entire tunnel 34 to 40 cm (about 14 to 16 inches) long. From five to nine

glossy white eggs (relatively small for the bird's size) are customarily laid once or twice a year and hatch in 31 days.

In its native countries, the monk parakeet favors areas of low rainfall in savannah, thorn scrub, palm groves, open forest, fruit orchards, and crop lands, most commonly in lowlands, but ranging to altitudes of 3,000 feet in the foothills of the Andes. Here the temperature may drop to as low as 20° F.

The species feeds on a variety of seeds and fruits, including apples, cherries, grapes, and citrus. In South America, where it has been described by a U.S. Fish and Wildlife Service publication as "one of the worst pests of agricultural crops," the monk parakeet reportedly destroys from 2 to 45 percent of those crops within its range, notably millet, sorghum, corn, sunflower, and a variety

Skin of the extinct Carolina parakeet, Conuropsis carolinensis, *in the Field Museum collection, collected in Florida in the 1890s. The species occurred only in the United States, mainly in the Southeast, though at one time it ranged up the Mississippi Valley and was apparently not uncommon in the Chicago region. The last known member of the species died in the Cincinnati Zoo in 1914, though there were unconfirmed reports of wild birds into the 1920s.*



of fruit crops. The incentive of a bounty for the birds has not succeeded in alleviating the problem.

The bird is gregarious as a rule, and in South America flocks of up to 50 birds have been observed. The bird flies swiftly, with rapid wing beats, usually not far above treetop height, screeching loudly as it goes. Its cry is so typically parrotlike that the sound is immediately recognizable to anyone who has visited those tropical areas where parrots are common.* A recent visitor to Chicago—a native of the tropics—had a heated discussion with his Hyde Park hosts (who were unaware till then of the local parakeet colony), insisting that he heard parrots in the trees. Monk parakeets can learn to whistle and to mimic human words, but not as well as some other members of the parrot family. They are friendly, intelligent birds, which accounts for their popularity as pets. Prices for the bird in Chicago-area pet stores range from about $25 and up.

Having first appeared in the New York area in 1967, the monk parakeet became a not uncommon sight there within several years and its greater New York population was then estimated at around 2,500. In the *Wilson Bulletin* of December 1973, John Bull of the Department of Ornithology, American Museum of Natural History, wrote that "Multiple releases by design and by accident have resulted in a sizeable resident population in southeastern New York, and the adjacent portions of Connecticut and New Jersey. These releases, that is escaped birds, came from broken crates at Kennedy Airport, accidental escapes from pet shops, aviaries, and private owners, as well as intentional releases by persons tired of caring for these parrots." Bull also mentions that the bird has bred in the outdoors in the London and Paris zoos and in the parks of Amsterdam (52.4° N latitude —further north than Saskatoon, Saskatchewan!)

At about the same time that the monk was trying to accommodate itself to the greater New York area, others of this species were reported to be taking up residence at various sites along the Atlantic Seaboard and as far west as around Pittsburgh. David B. Freeland reported at some length on the Pittsburgh community in the September 1973 *Wilson Bulletin*, where he noted that "at least five rather bulky nests had been located—all within a quarter-mile-square area covering two rather urbanized ridges and a partially wooded ravine. Two of the nests were on utility poles, three in trees, and all were the apparent work of one pair of parakeets. . . . On 12 August 1972 I observed both adults and one well-fledged bird. Residents of the area later confirmed the existence of three young of the year. . . . The birds have had wide exposure in the [local] media, but nest disturbance has not visibly deterred the birds from beginning what may well become a small colony similar to those on the Atlantic Seaboard."

Freeland's apparent hope that the parakeets would thrive in the Pittsburgh area was not to be fulfilled. According to Carnegie Museum ornithologist Kenneth Parks, there have been no reports of monk parakeets in that region for years. Much the same fate befell the New York city area population of wild monk parakeets. The Seventy-ninth Audubon Christmas Bird Count of 1978 reported only six for the entire state of New York, all of these in Brooklyn. (The highest Christmas count in the country for that year was seven in Fort Lauderdale, Florida.) According to Thomas Burke, of the Audubon Society's Rare Bird Alert team in New York City, none have been reported there for at least several months.

An accurate count of the current population of the parakeets in Chicago's Hyde Park is clearly not possible, and even an approximation would prove difficult since the birds are in constant activity, do not maintain a single, cohesive flock, and are not approachable; there may also be additional nests in the area that have escaped notice. (There are unconfirmed reports of a nest in Lincoln Park, on the city's north side; another nest, later destroyed, was confirmed on the far north side. There were also unconfirmed reports of flocks in Chicago's southwestern suburbs as well as in Kenosha, Wisconsin, about 60 miles to the north.) Flocks of as many as 17 individuals were observed at private feeders in Hyde Park during the winter of 1984-85—even following January's record-breaking low temperatures (−27° F). At least two smaller nests in Hyde Park, no larger than squirrel nests, in addition to the large communal nest near 53rd Street are known. Birds were active at one of these—100 yards north of the larger nest—in the late autumn of 1984. The other smaller nest, near the Jackson Park lagoon, is believed to be no longer active.

How have the birds managed to survive these five years in Chicago—through the coldest period in the city's history? The answer to this may be found in the largess of various Hyde Park residents who regard the monk parakeets as a cheerful, welcome addition to the neighborhood.

Among these Hyde Parkers are Robert and Rita Picken and David and Sylvia Smith, next-door neighbors who live about a mile from the communal nest, and who play host to the parakeets twice a day with the

**The main distinction between parrots and parakeets is size; the former are generally larger.*

Skins of the thick-billed parrot, Rhyncopsitta pachyrhyncha, *in the Field Museum collection (top specimen about 15 inches long). These were collected in Mexico in 1918. Now rare, and apparently confined to the pine forests of the Sierra Madre, the bird formerly ranged across the Rio Grande into Arizona and New Mexico, where the last confirmed sighting occurred in 1936. Other than the Carolina parakeet (now extinct), it is the only member of the parrot family known to have occurred in the United States naturally.*

The parrot family (Psittacidae) is well represented in warmer parts of the United States by a number of species in addition to the monk parakeet, though most of these are rare here and occur only locally if not intermittently. Notable among these are the budgerigar (*Melopsittacus undulatus*), from Australia, found in Florida and southern California; green parakeet (*Aratinga holochlora*), from Mexico, found in Texas and Florida; Hispaniolan parakeet (*Aratinga chloroptera*), from the West Indies, found near Miami; orange-fronted parakeet (*Aratinga canicularis*), from Mexico, found in New Mexico and from Florida to New York; black-hooded conure (*Nandayas nenday*), from South America, found in southern California; canary-winged parakeet (*Brotogeris versicolurus*), from South America, found in Florida, southern California, and northeastern states; orange-chinned parakeet (*Brotogeris jugularis*), from South and Middle America, found in Florida; yellow-headed parrot (*Amazona ochocephala*), from Mexico, found from Florida to California; red-crowned parrot (*Amazona viridigenalis*), from Mexico, found in southern California, Texas, and Florida; rose-ringed parakeet (*Psittacula krameri*), from Asia, found in Florida, southern California, and northeastern states; and blossom-headed parakeet (*Psittacula roseata*), from Asia, found in northeastern states. The best established of the above are the budgerigar, which is also the most widely domesticated member of the parrot family; the orange-fronted and the rose-ringed parakeets.

The thick-billed parrot (*Rhynchopsitta pachyrhyncha*), now found only in Mexico, is the only member of the group, other than the extinct Carolina parakeet, to naturally occur in the United States in historic times. This large, robust bird, measuring up to 16½ inches in length, was last reliably reported in the United States (Arizona) in 1936. A vicious biter, it seldom, if ever, was kept as a pet. The parrot would occasionally flock in from its main nesting area, the pine forests of Mexico's Sierra Madre, where it is now rare.

Part of the Hyde Park parakeet colony in the back yard of Robert and Rita Picken. During the winter of 1984-85, the feeding flock sometimes numbered as many as 17—even after the January cold wave, the severest in the city's history.

amply provisioned feeders in their back yards. Every morning and afternoon the birds arrive on schedule to feed on the sunflower seeds and mixed bird seed that have been set out for them. Now in their fourth season of providing for the birds, the Smiths and Pickens begin filling their feeders with the arrival of cold weather. Within a couple of days the parakeets have somehow come to know that the feeders have been reactivated.

Although monk parakeets are commonly reported to be aggressive at feeding stations ("intimidating all other birds from approaching the food," according to one Eastern observer), Rita Picken remarks on the sociability of the parakeets that flock to their stations, feeding companiably there and on the ground with sparrows, blackbirds, red-winged blackbirds, starlings, pigeons, and other avian visitors. The birds are easily disturbed, however, and even the most cautious human movement will startle them into the branches of nearby trees or send them whirling off, out of the neighborhood.

The parakeets' behavior, says Rita Picken, also provides clues to impending weather conditions. Before the coming of a storm, she reports, the birds arrive at the feeders earlier than usual and consume more seed. When balmy weather is in store, their visits are more casual and occur later in the day.

Until the 1984 season it was not known for certain if the Hyde Park colony was a breeding community. But

A monk parakeet shares a Hyde Park bird feeder with three house sparrows. This sociability of the Chicago parakeets disputes claims by Eastern observers that they "intimidate all other birds from approaching the food."

on Memorial Day last year a strong gale dislodged about a third of the communal nest; shattered eggs with four parakeet embryos were subsequently discovered on the ground among the nest debris by ornithologist Doug Anderson, vice president of the Chicago Chapter of the National Audubon Society and a close observer of the colony since its first appearance.

How do the environmentalists look upon this new immigrant species? In the early 1970s there was more than a little apprehension about the possibility that the monk parakeet would wreak disaster for farmers of various fruit and grain crops, that it might dislodge native species from their respective ecological niches (as the immigrant starling and house sparrow have done),* or that it might bring in diseases such as chlamydiosis (formerly called parrot fever or psittacosis) or Newcastle's

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**In addition to the house sparrow* (Passer domesticus) *and starling* (Sturnus vulgaris), *other introductions of foreign birds to continental U.S. that have been more or less successful include the black francolin* (Francolinus francolinus), *blue-gray tanager* (Thraupis virens), *cattle egret* (Bubulcus ibis), *chukar* (Alectoris chukar), *crested mynah* (Acridotheres cristatellus), *Eurasian skylark* (Alauda arvensis), *Eurasian tree sparrow* (Passer montanus), *European goldfinch* (Carduelis carduelis), *gray partridge* (Perdix perdix), *hill mynah* (Gracula religiosa), *melodious grassquit* (Tiaris canora), *muscovy duck* (Cairina moschata), *mute swan* (Cygnus olor), *red-whiskered bulbul* (Pycnonotus jocosus), *ring-necked pheasant* (Phasianus colchicus), *ringed turtle dove* (Streptopelia risoria), *rock dove or common pigeon* (Columba livia), *spot-breasted oriole* (Icterus pectoralis), *and spotted dove* (Streptopelia chinensis). *Many of the above are extremely local in range.*

Among the most "successful" introductions of foreign species have occurred in the state of Hawaii, where their success has often been achieved at the expense of native species. Eight of the 23 members of the Hawaiian honeycreeper family (Drepanididae) are now believed extinct, a phenomenon largely attributed to competition from introduced species. For discussion of introduced parrots in the continental U.S. see box, p. 15.

disease. Oscar Owre, a University of Miami ornithologist, came out strongly in 1973 about the "time bomb" posed by the presence of the monk and 11 other introduced parrot species; he remains apprehensive today. Owre is not alone in his convictions; other ornithologists and environmentalists fear that the monk may yet gain a foothold in this country and ravage crops as it has done in its native regions.

The American Museum's John Bull, cited above, seemed less concerned than Professor Owre that year, having "heard of no protests about depredations from landowners, gardeners, or fruit growers." He feared, however, that the story would be different in the South and Southwest, "where these birds would be sure to thrive." Since Bull made his observation twelve years ago, the monk parakeet has yet to demonstrate that it is capable of "thriving" anywhere in North America, including the South and Southwest. Doug Anderson is among those who believe that the bird is filling an ecological niche — at least in the Chicago area. He also observes that the bird's behavior in other parts of the country, where it was formerly regarded with some concern, has "moderated" and has demonstrated that it poses no threat to the environment. William J. Beecher, director emeritus of the Chicago Academy of Sciences and a noted ornithologist, says that "now, nobody cares about the birds; nobody is very worried about them." Roger Tory Peterson, perhaps the nation's best known ornithologist and a student of the monk parakeet in its native, Argentine habitat, observes that the monk parakeet "probably will not become established here."

What, then, are the chances for the Hyde Park colony? Will the birds build more nests in the community, breed successfully, and perhaps proliferate to other regions? The poor survival record for colonies elsewhere does not bode well for the future of the Hyde Park community. Nor does the fact that the conspicuous nests provide inviting targets for vandals or that the birds are a marketable commodity.

In view of these salient disadvantages, the parakeets could not have been more discriminating in their choice of a nesting site: Their massive nest is in a tree directly across the street from the residence of Chicago's Mayor Harold Washington, who is said to regard the colony with particular affection; and police cars, by happy circumstance, are parked around-the-clock within a few feet of the nest. Before Mayor Washington's incumbency, the nest was sometimes raided, but enough birds have evaded hunters' nets to keep the colony going. Should Mr. Washington change either his residence or his means of livelihood, the colony's future might again be in jeopardy. FM

A possible key to the continued survival of the Chicago parakeets is the police car, always within a few yards of their main nest. A clear deterrent to would-be vandals, the patrol car is parked there for the protection of Chicago Mayor Harold Washington, who lives close by. A second, smaller nest, 100 yards north, may be seen slightly left of the picture's center.

7. Dance shields (ndome). *Kikuyu, Kenya. Wood, pigment, 68cm, 66cm. Collected by Carl E. Akeley for the British East Africa Expedition. Cat. 104445, 104444. Photo by Diane Alexander-White and Ron Testa. N109424.*

Ovimbundu, Chokwe, Songo, and other Angolan peoples are represented by scores of artifacts, most of them documented with field notes and photographs. A ceremonial staff, sporting a standing female figure and herringbone-patterned finial (fig. 14), was collected in the largely Ngangela town of Cuchi, as indicated in the figure's characteristic hairstyle and body cicatrization (Delachaux 1936: 16-17, pl. 1).

Following the 1929 stock-market crash, museum-sponsored expeditions and large-scale purchasing stopped. Instead, staff activity focused more on collection research and on WPA-supported renovation of exhibits. Other means of acquiring specimens, such as museum exchanges, took precedence in the 1930s, especially in regard to the African collection. In 1933, the Musée d'Ethnographie in Paris exchanged four Western Sudanic specimens for several Mexican pieces owned by the Field. These Sudanic objects came from the well-known Dakar-Djibouti Mission organized by Marcel Griaule in 1931. In the mid-1930s, an exchange also occurred between the Field Museum and the Musées Royaux d'Art et d'Histoire in Brussels. Seventeen objects from the Belgian Congo enlarged the African collection; of special note is a raffia-edged mask (fig. 17) from the Pende people along the Kwilu River. Shar-

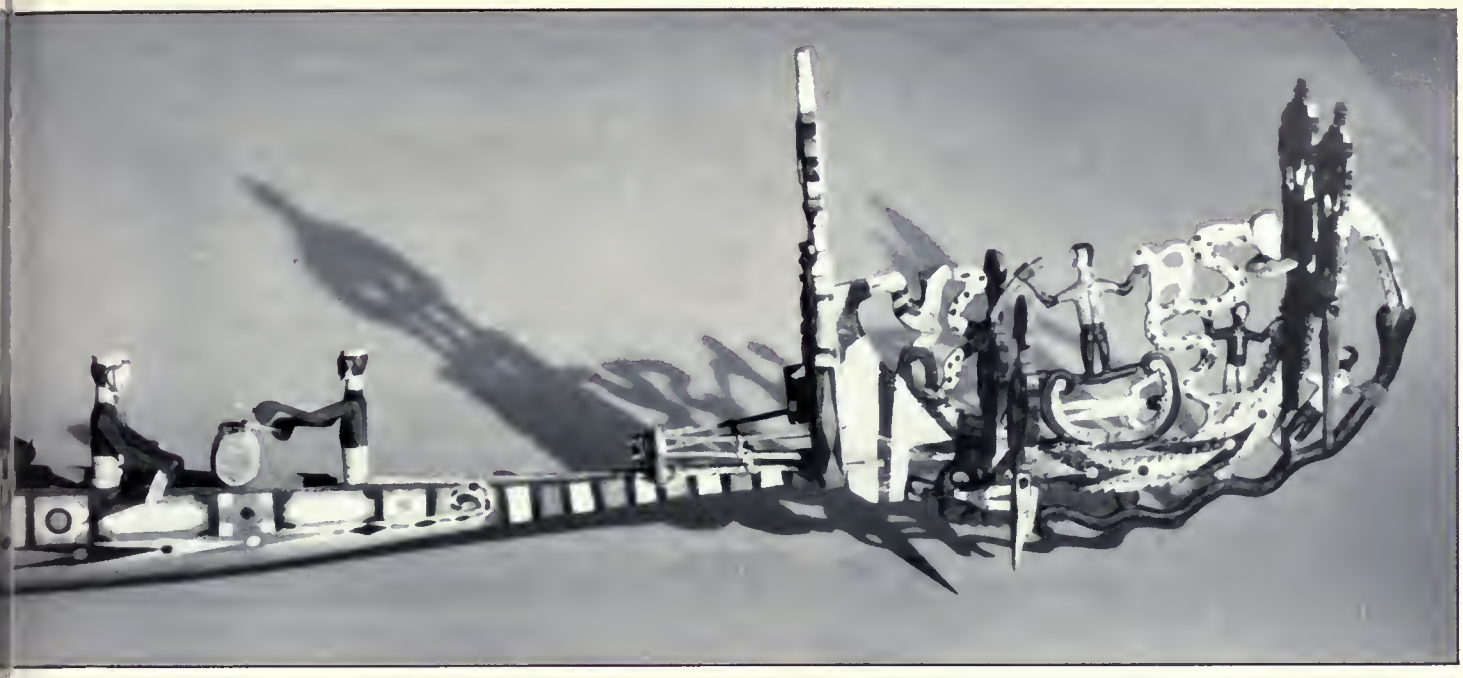
8. Mask (mfon ekpo). *Ibibio, Nigeria. Wood, pigment, woven and raw fiber, width 51cm. Gift of Calvin S. Smith. Cat. 25038. Photo by Ron Testa. N109452.*

9. Canoe model with prow ornament. Duala, Cameroon. Wood, paint, length 200cm. Museum purchase. Cat. 175469. Photo by John Bayalis. N100850.

ing many characteristics of the arts to the east and west, these small masks with heart-shaped faces belong to a corpus of initiatory, chieftaincy-related and theatrical masquerades (Lema Gwete 1982: 53).

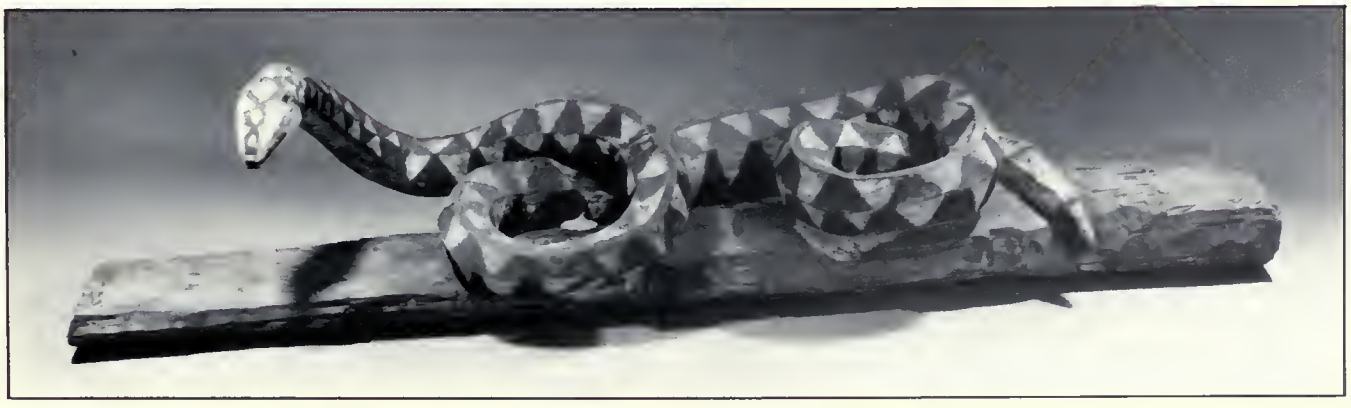
Although funds for purchasing were scarce in the years following the Depression, occasional gifts and exchanges continued to account for new acquisitions. A shift in priorities — from collecting new specimens to gathering information about the museum's concurrent holdings — placed a greater emphasis on the Field Museum as a research institution. After World War II, visiting research associates like Mexican artist/anthropologist Miguel Covarrubias began to bridge the philosophical gap between anthropological research and art historical studies within the context of the natural history museum.[8] With the incorporation of the curatorship of primitive arts in 1957, the museum was taking concrete steps toward a new way of seeing non-European art and culture. An example of the ideological shift was the 1961 exhibition "Primitive Artists look at Civilization." This exhibition, organized by Phillip H. Lewis, curator of primitive art and Melanesian ethnology, presented a cross-section of African, Oceanic, and

10. Ancestor figure. Hemba (?), Zaire. Wood, pigment, 49cm. Gift of the Arts Club of Chicago. Cat. 143954. Photo by Diane Alexander-White. N10923.



11. Helmet crest. Babanki, Cameroon. Wood, pigment, 77cm. Museum purchase. Cat. 175595. Photo by Diane Alexander-White. N109453.

12. Figure of a snake. Eton, Cameroon. Wood, pigment, length 212cm. Museum purchase. Cat. 175746. Photo by Diane Alexander-White and Ron Testa. N109420.



13. Plaque. Benin, Nigeria. Cast brass, 39.7cm. Gift of Mrs. A.W.F. Fuller. Cat. 210354. N99509.

14. Ceremonial staff (detail). Ngangela, Angola, Wood, figure 17.5cm, entire staff 129cm. Collected by Wilfred D. Hambly for the Frederick H. Rawson-Field Museum Ethnological Expedition to West Africa. Cat. 208746. Photo by Diane Alexander-White and Ron Testa. N109449.

American art objects that either portrayed or were conceptually conscious of "the exotic white man."[9]

One of the museum's most important acquisitions during these years was the collection of a noted English collector of Oceanic, African, and North American artifacts, Captain A. W. F. Fuller. Discussions between the Field and Captain Fuller resulted in his arranging for the museum to purchase his important Oceanic collection, numbering over 6,000 specimens. Following this 1958 transaction, Captain Fuller and his wife most generously gave the Field Museum more than 230 major African pieces. Of the specimens in this 1963 Fuller gift, 190 are from the court of Benin, collected by Fuller through art auctions, dealers, and other private collectors. A kola-nut box (fig. 15), carved in the form of leopard's head, was once a part of the turn-of-the-century Benin holdings of dealer W. D. Webster.[10] The subtractive rendering of anatomical features and the clever utilization of wood grain reveal the hand of an accomplished artist, as well as the inspiring powers of this feline totem. Animal imagery in Benin art is also present in several brass plaques from the Fuller collection. In one plaque (fig. 13), a European is flanked on each side by a pair of mudfish, a Benin symbol for the supernatural powers of their ruler, the *oba*.

Apart from the Benin objects, about forty pieces in this gift are from other African cultures. One of the finest objects in this group is an ivory bell/tapper (fig. 18) from the Yoruba people. This divination component incorporates the classic elements of its genre: a kneeling woman holding a round fan in front of her genitals and supporting a bitternlike bird on top of her head. Despite some expected ritual wear on this *iro ifa*, the lower bell still has its tiny ivory clapper, thus making it a prime implement for the divination ceremony.[11]

15. Kola-nut box. Benin, Nigeria. Wood, length 17.8cm. Gift of Mrs. A.W.F. Fuller. Cat. 210259. Photo by Diane Alexander-White. N109485.

Another stunning piece from the Fuller gift is a Luba ceremonial spear (fig. 19). As with many Luba objects, this one includes a female figure, resplendent in beads, a red body wrap, intricate scarifications, and an elaborate coiffure. The female presence on status objects like this one alludes to the essential role of women in chieftaincy-related activities among the Luba.[12]

Under the guidance of Leon Siroto, curator of African ethnology from 1965 until 1970, the African collection began to expand its holdings to include objects from previously under-represented African peoples. Siroto's stature in African studies and his contacts with scholars in the field prompted African-based American students and senior researchers to collect with the Field Museum in mind. One of the fruits of this kind of arrangement is an Akan comb (fig. 20) collected by Roy Sieber in southeastern Ghana. The framing of the *akuaba* head with engraved animals, a sacred heart, celestial bodies, and abstract designs most certainly has a proverbial purpose. That combs like this one are intentionally cryptic and open to interpretation speaks to their encoded, love-letter-like use by Akan men and women.[13]

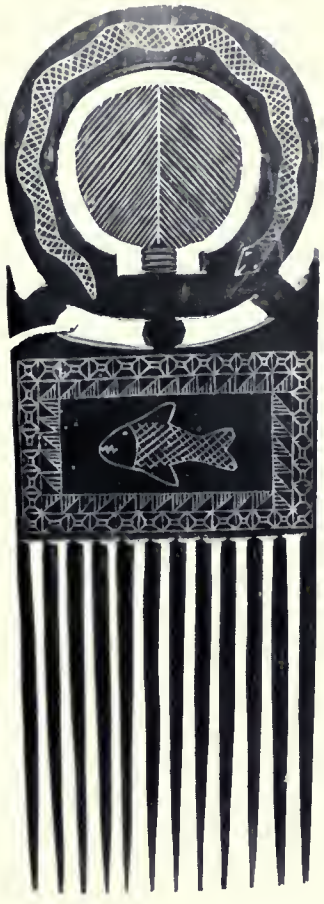
One of the more recent surges of collecting African objects for the museum revolved around the 1974 exhibition "Contemporary African Arts." Maude Wahlman, a consultant in African ethonology from 1971 until 1974, curated this exhibition and was instrumental in acquiring wood, stone, and calabash carvings; leather-,

16. Head crest. Calabar area/Efik (?), Nigeria. Wood, skin, basketry, 69cm. Museum purchase. Cat. 175615. Photo by Diane Alexander-White and Ron Testa. N109446.

17. Mask. Pende, Zaire. Wood, pigment, fiber, carved mask 16cm. Exchange with the Musées Royaux d'Art et d'Histoire, Brussels. Cat. 175976. Photo by Diane Alexander-White. N109442.

18. Divination bell/tapper (iro ifa). *Yoruba, Nigeria. Ivory, 43.2cm. Gift of Mrs. A.W.F. Fuller. Cat. 210424. Photo by Ron Testa. N109448.*

19. Ceremonial spear. Luba, Zaire. Wood, metal, beads, cloth, cowries. Figure 29.2cm, entire spear 162cm. Gift of Mrs. A.W.F. Fuller. Cat. 210462. Photo by Ron Testa. N109443.



metal-, and beadwork; textiles; pottery; as well as modern graphics and paintings. These examples of modern Africa indicated that the Field Museum is willing to examine not only aspects of traditional African life, but those of its recent periods of independence, industrialization, nationalism, and Pan-Africanism.

In recent years, the Field has again turned to the task of reexamining the nature of its commitment to the African collection. Because museum audiences have changed dramatically in the last twenty years, along with our perceptions and understanding of Africa, the need for a more effective presentation and utilization of African art and artifacts is a constant concern. Collection reassessment, measuring the degree of learning that actually takes place in permanent and temporary exhibits, and closer investigations into archival data are just a few of the many objectives that are on the museum's African agenda. It is hoped that collection surveys such as this article will introduce to unfamiliar readers this important repository of African Art, as well as extend an open invitation to experience the Field Museum of Natural History's African collection firsthand. FM

20. Comb (duafe). *Akan, Ghana. Wood, beads, 32.3cm. Museum purchase. Cat. 221468. Photo by Ron Testa. N109285, 109285A*

Notes

This article, along with my tenure at the Field Museum of Natural History, were made possible, in part, by a grant from the Illinois Humanities Council. I am grateful to the entire staff at the Field Museum, especially the departments of Anthropology and Education, for allowing me to explore their vast and wonderful learning institution. Special thanks go out to the following scholars who lent their collective expertise in surveying the African collection: Arthur Bourgeois, Kweku Embil, Marilyn Houlberg, Phillip H. Lewis, Roy Sieber, Leon Siroto, and Robert Farris Thompson.

1. Accession File 81, Department of Anthropology, Field Museum of Natural History, contains correspondence between the Field Columbian Museum and Carl Hagenbeck's Zoological Arena and World's Museum.

2. Accession File 941, Department of Anthropology, Field Museum of Natural History, includes a letter from Paul Gebauer, recounting events in and around Togo, circa 1903, as documented by Governor von Puttkamer in *Governeur Jahre in Kamerun* (Berlin, 1921).

3. An early twentieth-century travel account describes a textile from Bafilo, Togo, that seems identical to the Field Museum's cloth: "Some of the native cloth work...is exceedingly beautiful. I bought a number of specimens of it, among the best being a handsome toga-like garment of hand-woven blue stuff, elaborately embroidered, and which I am now wearing as an opera cloak in London, where it has been greatly admired. It is woven in narrow strips about two inches wide, and these are then sewn together by stitches so small, even, and regular, that they are practically invisible" (Gehrts 1915; 107).

4. The Museum Umlauff was apparently the source for German collector Carl Hagenbeck as well, as stated in a letter from George A. Dorsey to Museum Director F.J.V. Skiff, dated July 22, 1905. Accession File 967, Department of Anthropology, Field Museum of Natural History.

5. According to data received from Jan Klegkamp, this ceremonial helmet crest is from Bamendjo, a Bamileke town near the center of the Cameroon Grassfields.

A similar mask form, reproduced in Geneva exhibition catalogue (*Cameroun* 1980: 56-57, fig. 41), also hails from "Bamendou." According to Claude Savary, these large-cheeked masks, or *tu-kah*, are hand held and paraded every five years. But the style of the Field Museum mask crest, unlike the example reproduced in the Geneva catalogue, is unmistakable Babanki, as seen in its sensitively rendered eyes, nose, and mouth and in its overall finish. This crest, which was probably collected for the Museum Umlauff no later than 1914, is an example of the cultural exchange that has occurred among different Cameroon Grassfields peoples.

6. During a recent visit to the museum, Leon Siroto communicated his discovery of several other *njom* sculptural components in various European and American museums, including another carved figure in the Field Museum's collection. Mr. Siroto has been enormously kind in sharing with me his knowledge of Western Equatorial African art and religion.

7. For a related southeastern Zaire sculpture, see Lorene Heath Potter's article on the African collection of the Buffalo Society of Natural Sciences (1973: 37, fig. 9).

8. From a conversation with Donald Collier, Field Museum of Natural History Curator Emeritus of Middle and South American Archaeology and Ethnology, Chicago, Illinois, June 1984. Collier worked closely with Covarrubias.

9. The first of many colonial-themed, non-Western exhibitions, "Primitive Artists..." attracted the attention of not only museum visitors but the national press, as evidenced in a 1961 *Time* magazine review ("The Colonial School," July 7: 50, 53). I thank Phillip H. Lewis, Curator of Primitive Art and Melanesian Ethnology, Field Museum of Natural History, for describing the circumstances surrounding this exhibition.

10. Fuller's acquisition records state that he purchased this Benin box in 1917 and that it had formerly been part of the estate of Dr. J. G. Whittendale, late of Lime House, Bishop's Waltham. Benin label file (Captain A.W.F. Fuller), Department of Anthropology, Field Museum of Natural History.

11. Comparing the Field Museum *iro ifa* with other published examples may shed additional light on their age, symbolism, and place of origin in Yorubaland. Two early twentieth-century references, a broken bell/tapper (Frobenius 1923: pl. 175) and a "Sonnette" from "Benin" (Chauvet 1929: fig. 56) suggest at least a late-nineteenth-century date and an eastern Yoruba (Owo?) provenance for many of these divination implements.

12. In a forthcoming work by African art historian Arthur Bourgeois, these and other Luba objects will be closely examined from the perspective of prestige and leadership insignia.

13. From a conversation with Roy Sieber, Chicago, Illinois, July 21, 1984. A fascinating discussion with Ghanaian artist Kweku Embil, Chicago, April 1, 1984, elicited the following Akan axiom in regard to the chicken, sun, and moon imagery on the comb: "The hen knows daylight, but she leaves the crowing to the rooster."

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TOURS FOR MEMBERS

Ecuador and The Galapagos Islands

May 27-June 11

The Galapagos Islands affect our imagination like no other place on earth. To set foot on these remote islands is to return to a primeval land isolated and protected for millions of years. A distance of 600 miles off the coast of Ecuador are these lost specks of volcanic land on which nature evolved a separate microcosm of animals and plants.

Our tour will begin with a visit in the host country of Ecuador, which offers an opportunity to enjoy the charm of Old World ambience, along with the color and distinction of the centuries-old Indian market villages of Lactacunga and Ambato.

To enhance your learning experience on this tour, Dr. Glen E. Woolfenden, research associate at Field Museum, and professor of zoology at University of South Florida, will be our leader and will accompany the group from Miami and return.

This is our exciting itinerary:

May 27: Fly from Chicago O'Hare airport to Quito via Miami.

May 28: Tour the city of Quito, visit the fabulous Archeological Museum, view the church of San Augustin and Museum of Colonial Art.

May 29: Visit the art galleries of the painters Guayasamin and Viteri; tour the Olga Fish Folklore Gallery. In the afternoon visit the Equatorial Monument. Also, visit the Indian villages of Pomasqui and San Antonio and the crater of Pululahua.

May 30: Full-day excursion over the Andes' western ridge, down into the coastal jungles with their banana, cocoa, and coffee plantations and see the village of the Colorado Indians, colorful in dress and custom.

May 31: Full day of birding in the area of Papallacta. Ecuador is home to more than 1,400 species of birds.

June 1: Morning departure by bus to the Latacunga-Ambato Valley stopping at Latacunga Indian market and the Cotopaxi volcano, where we will visit a small museum at the base of the volcano, and on to Ambato with its huge market.

June 2: Leave the frosty Andean heights, travel across a fertile plain and past highland villages, via Riobamba and Devil's Nose pass to Guayaquil, Ecuador's chief port, where we'll stay overnight.

June 3: A morning flight to Baltra, where we will board the MV *Santa Cruz*. Comfort is indeed the keynote for our life aboard ship in both clothes and atmosphere, with casual attire recommended. Tonight and each evening during the cruise we have a slide presentation and a lecture outlining the next day's highlights.

June 4: The first island we see is Bartolome, site of Pinnacle Rock, the most widely recognized landmark in the Galapagos. Later we cruise in Darwin Bay. Tower island is considered one of the most complete bird islands, with virtually millions of sea and land birds resident to its shores.

June 5: Cruising Isabela and Fernandina Islands, entering Tagus Cover in the morning.

June 6: Cruising Baltra and North Seymour Islands. After a brief stopover at Baltra, we cruise to North Seymour and will be transported to the rocky shore via small craft. Our first encounter, as we walk on the island, is with dense colonies of blue-footed boobies.

June 7: Cruising Hood and Floreana Islands. We follow the marked trails on Hood Island to search for its own species of mockingbird and its most spectacular part-time resident, the waved albatross. Along the way, we catch glimpses of masked boobies and several species of finch. We land at Punta Cormorant on Floreana Island and on an inland lagoon we'll see where multitudes of flamingos nest. Floreana's vegetation is particularly interesting.

June 8: Cruising Santa Cruz and Plaza Islands. Upon arrival at the village of Puerto Ayora on Santa Cruz we walk directly to the Darwin Research Station for a briefing. This afternoon, we call at tiny Plaza Island, where sea lions swim out to welcome us.

June 9: We land early in the morning on a beach of black lava sand on James Island, then hike to a tranquil crater lake where flamingos feed. Next we can swim with (or just observe) the fur seals in one of the pools cut into the cliffs by surf erosion. After lunch we cruise past unusual cinder cones and lava formations along the coast en route to Buccaneer Cove, the former refuge of pirate ships.

June 10: This morning we cruise to Baltra, disembarking in time to board our flight to Guayaquil. En route to the Oro Verde Hotel we will tour Guayaquil, seeing the Avenida Olmedo, city watchtower, government buildings, and the municipal museum. In the evening we'll enjoy a gala farewell dinner.

June 11: Return to Chicago via Miami. Early evening arrival at O'Hare.

Price per person (double occupancy): $3,545 for main deck cabins. Upgrade to upper deck: $150; upgrade to boat deck: $310. An extension to Peru is optional. The tour price includes land and cruise costs and round-trip economy air fare. The tour is limited to 25 people, and early reservations are recommended. A $500 deposit per person should be sent to Field Museum Tours.

Alaska and The Pribilof Islands

June 5-19

June 5: Fly from Chicago's O'Hare to Sitka. Welcome dinner.

June 6: City tour of Sitka. Marine wildlife motor raft trip with dinner on board cruise vessel.

June 7: Late morning flight to Juneau. Mendenhall River raft trip with lunch on board. Evening outdoor salmon bake.

June 8: Morning flight to Glacier Bay. Glacier Bay cruise aboard the MV *Glacier Bay Explorer.* Overnight on board ship.

June 9: After completing Galcier Bay cruise, afternoon flight to Fairbanks via Juneau.

June 10: Ride the Alaska Railroad to Denali National Park. Afternoon at leisure; salmon bake dinner and overnight at McKinley Chalets.

June 11: Full day tour to Kantisna. Return to McKinley Chalets for dinner and overnight.

June 12: Morning at leisure. Afternoon motorcoach trip to Anchorage.

June 13: Morning at leisure. Afternoon tour to Potter's Marsh Bird Refuge.

June 14: Morning at leisure. Afternoon Float Trip on Eagle River with dinner on board.

June 15: Flight to St. George Island.

June 16-17: Two full days exploring St. George Island.

June 18: Return flight to Anchorage. Farewell dinner.

June 19: After breakfast transfer to airport for return flight to Chicago.

Our leader will be Dr. John W. Fitzpatrick, associate curator and head of the Division of Birds at the Field Museum, where he also serves as curator-in-charge of Scientific Services and chairman of the Science Advisory Council. He is an experienced tour lecturer, most recently leading Field Museum tours to Ecuador and the Galapagos Islands, and to the Lesser Antilles.

Tour price: $4,625.00, based on double occupancy (includes round trip coach class air fare). We hope you can join us for this exceptional tour. A deposit of $500.00 per person will confirm your reservation.

ADDITIONAL TOURS FOR 1985

Grand Canyon Rafting Trip

May 24-June 2

China and Tibet

August 10-September 1

Kenya

September 6-23

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

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The Art of Cameroon

March 9–June 16

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

June 1985

"Garden in the City"
Horticulturist Virginia Beatty
Tells How to Grow a Better Garden
June 1 & 2

Field Museum
of Natural History
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COVER

A mid-19th century French artist visualizes how the earth is ripped asunder by a comet, from Le Ciel et L'Universe, *by Théophile L'Abbé Moreaux, published 1857. Curator Edward Olsen tells us more about the idosyncracies of comets, notably Halley's Comet, on pages 18-25.*

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Events

GARDEN IN THE CITY

"Garden of Eden," film

June 8, 2:00–2:30 pm
Ecology Hall, Second Floor

The *Garden of Eden* explains—on film for the first time—why protecting the great variety of the world's plant and animal life, the gene pools of our planet, is critical to our future. Combining a series of compelling interviews with a mixture of animation, archival news reel clips, and feature film footage, The *Garden of Eden* reveals the reasons for conservation today.

Color My World, Demonstration

Saturday, June 15, 1:00–3:00 pm
Stanley Field Hall, Second Floor.

Add color to your life on a dull day. Centuries before commercial dyes were invented, you could have colored your T-shirts with things from your own kitchen. Find out what kinds of household and backyard items you can use for fabric dyes. Watch white wool become the colors of the rainbow. Then try your hand at spinning it into yarn and weaving it into a piece of cloth.

This program is free with museum admission and no tickets are required.

Children's Program

June 22, 2:00–3:00 pm
Ecology Hall, Second Floor

WHAT DO PLANTS DO?
While emphasizing the importance of plants in our daily lives, this film explores the many uses of plants and the ways plants adapt to life in a particular habitat.

WILD GREEN THINGS IN THE CITY
A young girl learns about plants that live in an urban environment. After reading about these plants in library books, she searches for plants in neglected corners and vacant lots, and transplants them into containers at home.

GROWING, GROWING
An impressionistic film about children and their gardens. This photomontage features flowers, vegetables, and children to the accompaniment of lighthearted verse and song.

At the conclusion of the children's film program, join us at the entry room to the Ecology Hall and view our display of woodland and prairie wild flowers, and vacant lot plants. Examine a whole gamut of seeds—from tiny dandelions to coconuts, which demonstrate how plants spread their seeds.

June 22, 2:45 pm

A GARDEN OF HERBS—POTPOURRI
Herbs are known for their medicinal, savory, and aromatic qualities. Become familiar with these plants, many of which you can grow at home, and construct your own potpourri sachet from a fragrant bouquet of dried flower buds and petals.

All Garden In the City programs are free with Museum admission, and tickets are not required.

CONTINUED⇨

CONTINUED from p. 3

Events

Family Feature

Growing Together

June 1 and 2, 1:00–3:00 pm
Stanley Field Hall, Second Floor.

Grow a philodendron in an old tennis shoe or an asparagus fern in a Chinese bronze pot. The first weekend in June is a great time to plant that garden, and you don't need an acre of land to do it. Plants can grow in almost any kind of container, and can be a city gardener's best friend. Chicago horticulturalist Virginia Beatty is on hand to demonstrate and give tips on all aspects of city gardening. Get some ideas on how to make the most out of the space you have. Start a plant of your own to take home and watch it grow.

This program is free with museum admission and no tickets are required.

June Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history and Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

June

1 1:30 pm. *Tibet Today* (slide lecture). See Lhasa and other towns now open to the public.

2:30 pm. *Tour of Tibet* (tour). Take a closer look at the objects in our Tibetan hall.

2 1:00 pm. *Traditional China* (tour). Examine the imagery and craftsmanship represented by Chinese masterworks in our permanent collection.

9 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

15 11:30 am. *Ancient Egypt* (tour). Explore the traditions of ancient Egypt from everyday life to myths and mummies.

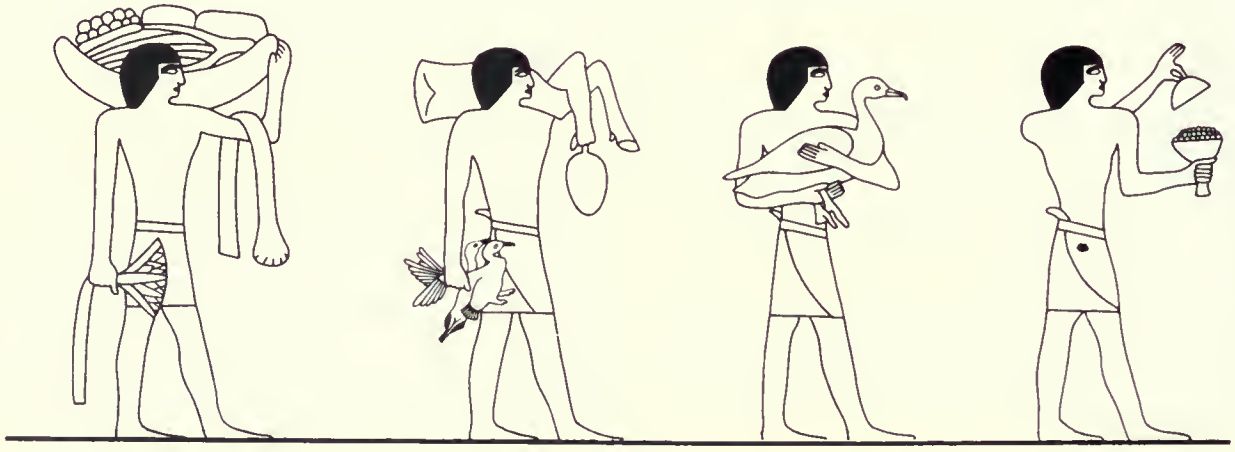
16 1:00 pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

22 1:00 pm. *Red Land/Black Land* (tour). Focus on the geography of the Nile Valley and its effect on the Egyptians who lived and ruled during 4,000 years of change in religion and cultures.

23 1:00 pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

30 12:30 pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

These public programs are free with museum admission and tickets are not required.



FIELD BRIEFS

Recent Visitors

Friday, March 8, marked the Members' Preview of the temporary exhibit "The Art of Cameroon," at Field Museum. Among the evening's special guests were Mr. Harold Washington, mayor of the City of Chicago, shown at right. With Mr. Washington is Dr. Tamara Northern, curator of ethnographic art at Dartmouth College, who is also curator of the exhibit. Mr. Washington holds a copy of the exhibit catalog, written by Dr. Northern.

"The Art of Cameroon," organized and circulated by Smithsonian Institution Traveling Exhibit Service (SITES), was made possible by a grant from Mobil Corporation. It continues on view at Field Museum through June 16.

Earlier this season, Field Museum was visited by Peter Jennings (lower photo, at right), anchor and senior editor of ABC World News Tonight, who was particularly interested in the exhibit "Maritime Peoples of the Arctic and Northwest Coast." With him are (l. to r.) Field Museum President Willard L. Boyd, Carolyn P. Blackmon, chairman of the Museum's Department of Education, and Gretchen Babarovic, Mr. Jenning's assistant.

DIANE ALEXANDER WHITE

RON TESTA

FIELD BRIEFS

Col. Clifford Gregg (left) and William H. Mitchell (right), at January 24, 1949, fortieth anniversary celebration in honor of Stanley Field, then president of Field Museum. Others in the photo are (l. to r.) Marshall Field III, George A. Richardson, and Lester Armour. Gregg was then in his twelfth year as director, Mitchell in his twenty-first as a trustee. Field, Richardson, and Armour were also trustees.

Clifford C. Gregg and William H. Mitchell Celebrate 90th Birthdays

Col. Clifford C. Gregg, who served for nearly 25 years as director of Field Museum, and William H. Mitchell, who served on the Board of Trustees for 52 years, have the special privilege in 1985 of celebrating their ninetieth birthdays. Mr. Mitchell was born on January 31, 1895; Col. Gregg was born on July 9 of the same year. Both men are now Field Museum life trustees.

The fourth director in the Museum's history, Col. Gregg joined the staff in February 1926 as assistant director, serving in that post under the directorships of David C. Davies (until 1928) and Stephen C. Simms. Upon the death of Simms in January of 1937, Gregg was made acting director; the following June the Board of Trustees elected Gregg director as well as secretary of the Museum, both posts having been held by Simms.

It was a particularly difficult period for the Field Museum, as indeed it was for all nonprofit institutions at the depths of the Depression. Revenues from endowment fund investments were at all-time lows, as were amounts received from taxes levied for the benefit of museums. But Gregg served with uncommon distinction. Among his notable achievements was the establishment of the Museum employees' pension plan, which contributed immeasurably to the betterment of staff relations, morale, and performance.

Having served as a lieutenant with the infantry during World War I, Gregg had continued his association with the Army Reserve Corps, and in July 1942, then with the rank of major, he was recalled for active duty in World War II. He remained on leave of absence from the Museum directorship until May 1945, when he was discharged from active duty with the rank of colonel. He continued as director until January 1962, when he retired at age 66. As he resigned the directorship, the Board of Trustees elected Gregg president of Field Museum. He remained active on the Board of Trustees until 1969, when he was made a life trustee.

The son of a founder and incorporator of Field Museum, John J. Mitchell, William H. Mitchell carried on the tradition of family service to the Museum when he was elected to the Board of Trustees in January 1928. During his extraordinary period of tenure—52 years—he served on the Nominating Committee, the Finance Committee (later designated Investment Committee), Executive Committee, Development Committee (later designated Resource Planning and Development Committee), and Capital Requirements Committee.

Mitchell played a major role in Field Museum's first Capital Campaign—both as a solicitor of funds from others and as a pace-setting donor in his own right. In 1974, mindful of the Museum's new situation, William Mitchell made a decision which epitomizes the meaning of his Field Museum career. He determined to focus his attention on two things: investment and development of the Museum's resources. Because of this far-sighted stewardship, the Museum now is poised for its second century. Indeed, it has the vigor to go forward with a second Capital Campaign designed to strengthen the Museum. In 1974, the year when Mitchell turned especially to Museum investment and development work, he and his wife, Anne, were both elected Field Museum benefactors.

Happy Birthday, Clifford C. Gregg and William H. Mitchell!

Robert K. Johnson

Robert K. Johnson Co-Convener for International Conference on Pelagic Biogeography

The National Science Foundation (NSF) has awarded $17,661 to Field Museum in support of the International Conference on Pelagic Biogeography being held in Amsterdam May 28 through June 6. Robert K. Johnson, curator of Fishes, a specialist on deepsea fishes, is conference co-convener and president of the Scientific Committee for the conference. NSF funds will be added to previously awarded grants from the Office of Naval Research, UNESCO, the Netherlands Ministry of Education and Science, the Netherlands Marine Research Council, and the Royal Dutch Academy of Sciences.

This funding is paying the conference expenses of 60 participating marine scientists from 14 nations. The purpose of the conference is to bring together a diverse group of marine biogeographers, scientists who seldom interact outside their respective disciplines. This permits extensive research presentations, review, and discussion of modern concepts and advanced methodologies in studies of the origin and maintenance of pattern in the distributions of open-ocean organisms; it also assists in the development of research agendas for the future. In addition to its direct conference support, UNESCO has agreed to publish the volume of conference proceedings.

Fitzpatrick Coauthors Monograph on Florida Scrub Jay

The Florida Scrub Jay, coauthored by John W. Fitzpatrick and Glen E. Woolfenden, was published recently by Princeton University Press. Fitzpatrick is associate curator of Birds and chairman of Field Museum's Department of Zoology. Woolfenden is professor of zoology at the University of South Florida, Tampa.

Subtitled "Demography of a Cooperative-Breeding Bird," *The Florida Scrub Jay* (406 pp.) is the twentieth in a series of technical works entitled "Monographs in Population Biology," edited by Robert M. May.

Florida scrub jays are an excellent example of a cooperative-breeding species, in which adult birds often help raise offspring not their own. For more than a decade Woolfenden and Fitzpatrick have studied a marked population of these birds in an attempt to establish a demographic base for understanding the phenomenon of "helping at the nest." By studying both population biology and behavior, the authors find that habitat restraints rather than kin selection are the main source of the behavior of Florida scrub jays: the goal of increasing the number of close relatives other than descendants in future generations is of relatively minor importance in their cooperative-breeding behavior.

Fitzpatrick and Woolfenden also coauthored an article on the Florida scrub jay, "The Helpful Shall Inherit the Scrub," which appeared in the May 1984 issue of *Natural History.*

Peter Crane Chosen One of Chicago's "Ten Outstanding Young Citizens"

Peter Crane, associate curator in the Department of Geology, was chosen recently as one of Chicago's "Ten Outstanding Young Citizens for 1985." The prestigious award was conferred on Crane by the Chicago Junior Association of Commerce and Industry on April 10 at an awards dinner at the Drake Hotel.

This was the third time in recent months that Crane has been the recipient of special honors. Early in 1984 he was given the British Paleontological Association's annual award for the best paper given by a research worker under the age of 30; late in the year he was recipient of the Bicentenary Medal of the Linnean Society of London. The Linnean Society is the premier society for professional biologists in the United Kingdom and makes the award annually in recognition of scientific work done by a biologist under the age of 40. More than a year ago he was appointed co-editor of the premier scientific journal *Paleobiology,* an

Peter Crane

honor which is unusual for someone his age.

Field Museum, too, has given recent recognition to Crane by promoting him on April 20 to associate curator.

Crane joined the Field Museum staff in September 1982 after a year of research at Indiana University and three years on the faculty of the University of Reading, England, the institution where he earlier received both his bachelor's degree and Ph.D. Since his arrival at Field Museum he has chaired search, publications, and science advisory committees and has helped to resurrect the Field Museum seminar series. His research activities focus on Cenozoic plant evolution, morphology, and phylogeny. He has published his work as well as presented it at international meetings and university seminars. His work on angiosperm evolution represents some of the most distinguished in that field.

Kennicott Club Meets

The June meeting of the Kennicott Club, a natural history society named for Chicago's first naturalist, Robert Kennicott, will be held on Monday, June 3, beginning at 7:30 pm. The meeting place will be Sciences Building 130, Department of Earth Sciences, Northeastern Illinois University, located at 5500 N. St. Louis Avenue, in Chicago. The evening's speaker will be Prof. Charles Shabica, of Northeastern Illinois University, whose topic will be "Richardson's Guide to the Fossil Fauna of Mazon Creek: Status of the Shaggy Dog Story." The June meeting will be preceded by 6 pm dinner at the Mongolian House, 6345 N. Western Ave.

Ornamented Coats of The Koryak

by James W. VanStone
Curator of North American Archaeology and Ethnology

ONE OF THE LARGEST and most important native groups inhabiting northeastern Siberia are the Koryak, who occupy the northern part of the Kamchatka Peninsula, the Kamchatka Isthmus, and the adjacent continental area (see map). In the nineteenth century the Koryak were divided into nine territorial groups and their subsistence activities included reindeer herding, sea mammal hunting, land hunting, and fishing. The various groups differed in their economic emphasis. Those living in the interior were herders of reindeer and knew nothing of sea hunting, while groups living on the coast hunted sea mammals exclusively. In 1900 the total population of the Koryak was 7,530.

Among all the Koryak, winter clothing was made primarily of reindeer skins. Koryak women were among the best skin sewers in the far north, being particularly noted for their fine and elaborate needlework. The skins of the adult reindeer were never used for clothing, only those of fawns beginning with the newly born and including animals up to seven months old. The warmest coats were made of the skins of fawns six or seven months old which were killed late in the fall. These skins consisted of fine, soft hair that was very thick but not long. Clothing made of fawn skins was warm and light in weight.

Among the finest examples of reindeer skin winter clothing were the men's and women's traveling coats which usually, but not always, had hoods. The man's traveling coat was double, with one garment inside the other and so adjusted that the two could be put on and taken off together. The inner coat was worn with the hair facing the body, while the hair of the outer coat faced outward.

Russianized Koryak, wealthy reindeer breeders, and those engaged in trade preferred outer coats made of dark skins. The inner coat was usually constructed from the skins of younger fawns, from one to three months old, so that the double coat would not be so thick as to hinder movement. The soft hair of young fawns was also more comfortable to wear next to the skin.

All Koryak winter coats for both men and women were carefully constructed and skillfully sewn, but elaborate decoration occurred only on those garments known as dancing coats, which were worn at ceremonies honoring the spirits of whales killed by Koryak hunters. The ethnographic collections of Field Museum contain two such coats collected at the end of the nineteenth century among the Alyutortsy, one of the nine Koryak subgroups.

The Alyutortsy Koryak occupied a large area of the

1. FM photo, N86147.

upper Kamchatka Isthmus and their economy was unusual in that it combined fishing and sea mammal hunting with reindeer breeding. With rare exceptions, all the Alyutortsy hunted sea mammals, especially in spring when seals and whales were plentiful among the drifting ice floes. In summer during fish runs, those reindeer-breeding Alyutortsy who lived in the interior migrated to the mouths of rivers, where they lived with their sedentary relatives while preparing a supply of fish for winter use. Hunting sea mammals was the principal occupation of those Alyutortsy living in permanent settlements on the Bering Sea coast.

The first of the two Alyutortsy Koryak dancing coats (32009) in Field Museum's collections, the less elaborately decorated of the two, is made of dark brown fawn skin trimmed with sealskin and white deerskin (fig. 1). Sewing throughout is with sinew. The inner coat with the hair facing the body is constructed of a number of large rectangular pieces of skin filled out with numerous small pieces of irregular shape. Around the lower edge is a wide rectangular band also filled out with smaller pieces. At the cuffs and inside the hood this inner coat is stitched to the outer garment to hold it in place. The skin fragments which make up the inner hood are from an adult reindeer.

The outer coat is made from pieces of very dark brown fawn skin. The pattern of the front and back consists primarily of large rectangular pieces which flare toward the lower edge. These are joined along the sides by narrower rectangular pieces. At either side in front and on the back are narrow, vertical strips of fur mosaic in brown and white deerskin, each small piece separately cut and stitched together in a pattern of zig zags.

Each sleeve consists primarily of two rectangular pieces of skin sewn together along both sides of the arm. The cuffs are trimmed with narrow rectangular strips of beaver fur. The sleeves are very full at the shoulders and about the forearms so that the wearer can draw his or her arms out for extra warmth. The wrists are narrow to prevent access of cold air.

Below the hood opening is sewn a large flap made of rectangular pieces of skin from reindeer legs. There are white strips on the sides of this flap, and between the brown sections are three separate vertical strips of fur mosaic consisting of paired white pieces with alternating brown and white squares between them. This flap, which when raised served to protect the wearer's face from cold winds, is edged with tanned, bleached sealskin. Decoration of the flap is a particular feature of dancing coats. In funeral coats, which were made of white fawn skin and nearly covered with decoration, especially in front, this flap covered the face of the deceased.

The hood consists of numerous separate pieces of irregular shape. At the top there is a fur mosaic pattern of large brown and white zigzags which does not show in the photograph. The opening of the hood is edged with tanned, bleached sealskin.

Around the lower edge of the garment is a broad band of fur mosaic in brown and white, consisting of squares, rectangles, diamonds, and triangles. As in the other decoration, each small piece is separately cut and stitched to the others. Below this broad band is an edging of rectangular pieces of skin on which the hair is somewhat longer than on the rest of the garment.

The second dancing coat in the collection (32007) (fig. 2) is also double, the inner coat being constructed of scraps of fawn skin of various sizes. It is fastened to the outer coat at frequent intervals with braided sinew. On the inner surface of the hood and the insides of the sleeves, the inner coat consists of pieces of adult deerskin.

Construction of the outer coat, which is sewn with sinew throughout, is similar to that of the previously described garment, with broad rectangular pieces of dark fawn skin on the front and back joined by narrower pieces of the same shape at the sides. The sleeves, each consisting essentially of two pieces, are edged with beaver fur. They are full but do not narrow at the cuffs. The hood consists of a number of small pieces of skin and a separate piece around the opening. The square flap below the hood is constructed of several pieces of reindeer leg skin on the underside with narrow, rectangular strips of brown fawn skin on the outer surface to form a subdued decorative pattern. There is a border of reindeer leg skin. In the photograph the flap is shown roughly in the position it would have when covering the face.

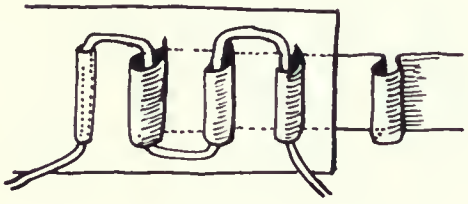
An outstanding feature of this garment is the elaborate decorative band around the lower edge (fig. 5). At the top of this broad band are fur mosaic patterns featuring brown and white diamonds, squares, and rectangles. There are narrow strips of tanned, dark sealskin near the upper and lower edges of the decorative band which feature designs made by a method called "slit embroidery" A series of narrow slits were made in the dark sealskin, and narrow pieces of bleached sealskin of the same width as the slits were laid under them. A small loop of this skin was pushed from underneath up through the slits, where it was caught by a sinew thread which lay on the surface of the skin. The thread was passed through the loops which were then drawn tight (fig. 4). The technique of slit embroidery is such that the designs necessarily consist of a long series of connected rectangles.

Between the two strips of dark sealskin with slit embroidery is a wide band of embroidered rectangles, squares, and diamonds in red, blue, purple, and several shades of brown cotton thread; some of the colors have faded considerably. Along the lower edge of the decorative band is a narrow strip of tanned, bleached sealskin

2. FM photo, N86150.

3. *From W. Jochelson,* The Koryak, *pt. 2, pl. IV, fig. 1.*

into which, by the slit embroidery technique, a continuous length of sinew has been inserted. Below that, by the same technique, tassels of the hair of young seals dyed red are doubled over and passed through the slits. Finally, the lower edge of the garment is trimmed with rectangular pieces of beaver fur.



4.

A characteristic feature of the ornamentation on these two garments, and, in fact, on all Koryak clothing, is that the designs are arranged throughout in horizontal or vertical bands. These decorative bands are made separately from the rest of the garment and, as they are constructed, wound on reels. When a garment is worn out, the decorative elements may be detached and saved to use again on a newly made coat.

Most of our knowledge concerning Koryak clothing, and in fact all aspects of Koryak culture, is derived from the work of Waldemar Jochelson, a Russian ethnographer who worked among these people in the winter of 1900-01 as a member of the Jesup North Pacific Expedition sponsored by the American Museum of Natural History in New York.* His collections are in that institution; there are also sizeable Koryak collections in Soviet museums, particularly the Peter the Great Museum of Anthropology and Ethnography and the Museum of the Peoples of the U.S.S.R., both in Leningrad.

In his monograph on the Koryak, Jochelson described villages of the maritime peoples, especially their summer villages, as being located primarily on rocky shores rising to a considerable height above the sea. While the men of a village were out hunting, the women frequently went outside to sit on the roofs of the houses and await the return of the hunters' boats. When the women belonging to a certain house observed one of their boats returning and towing a whale, they put on their dancing coats and went down to the beach to meet the whale. If there was an old man in the house who stayed home and did not join the hunt, he also put on a dancing costume, which sometimes included elaborately decorated reindeer skin boots.

The women and old men were joined by women from other houses who also wore their festive coats. All welcomed the whale while dancing around a fire that was brought from the hearth and built up outside the house (fig. 3). This dance was designed to show great respect for the dead whale, which was believed to be

*Jochelson, W. The Koryak. *Memoirs of the American Museum of Natural History,* vol. 11. *Publications of the Jesup North Pacific Expedition,* vol. 6. New York.

5. *FM photo, N86152.*

visiting the village. If treated kindly, the animal would repeat its visit the following year and persuade its relatives to come along. According to Koryak belief, whales, like all other animals, constitute a family of related individuals who are grateful for any kindness and respect they receive.

The collections also contain a third decorated coat (32014), which is identified in the catalog as a "woman's dress" (fig. 6). It is made of white fawn skin, is not double like the others, and lacks a hood. The front and back consist of large, rectangular pieces of skin which flare toward the lower edge. On each side there is a narrow single piece which joins the front and back; there are also occasional patches. The full sleeves consist of several narrow rectangular pieces sewn horizontally. The cuffs and collar are separate pieces of dark brown fawn skin and there is a short opening in front below the collar which is edged with dark brown fawn skin along one side.

Around the lower edge is a broad band of fur mosaic in brown and white skin, utilizing small squares to form a pattern of large diamonds. Along the upper and lower edges of the band is a row of alternating brown and white triangles. The diamond design has been emphasized by fastening small tufts of red yarn to the small white squares with short lengths of sinew. Sewing throughout this garment is with single-strand sinew.

Jochelson described funeral coats made of the skins of white fawns that were worn by deceased individuals when the body was prepared for cremation. However, such garments are said to have had hoods and were usually much more highly decorated than this coat. It is clear that this garment was not made for everyday wear and although its specific use cannot be determined with certainty, its decorative band is a fine example of the fur mosaic technique.

The interesting methods of artificially processing skin that have been described here, particularly the technique of slit embroidery, which is peculiar to the Koryak, are now almost forgotten. Museums and institutes in the Soviet Union interested in preserving native craft techniques are developing programs through which traditional sewing techniques can be taught to a younger generation of native craftswomen so that the skills of their ancestors will not be forgotten. A recently published manual for teachers in the Soviet Far East describes and illustrates a variety of traditional sewing techniques that can be taught in the local schools, sometimes by the teachers but more often by older native skin sewers, and will, hopefully, ensure the survival of one of the most intricate skin-working traditions in the world. FM

6. *FM photo, N86149.*

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Volunteers Honored

Field Museum honored its 1984 volunteers with a special reception on February 14 in Stanley Field Hall. Together with their guests, volunteers had a chance to visit with staff members in a festive, relaxed atmosphere (brightened with balloons) away from the libraries, laboratories, and classrooms where they customarily perform their volunteer work.

In a brief ceremony, Willard L. Boyd, president, welcomed the volunteers and expressed the Museum's gratitude for their contributions during the preceding year. James J. O'Connor, chairman of the Board, spoke of the group's dedication. Of the current 282 volunteers, 70 percent have been volunteering for over one year, 54 percent for over 3 years, and 9 percent have been active volunteers for over 10 years. During 1984 the volunteer contribution of 36,579 hours was the equivalent of 22.6 additional full-time staff members.

The special honoree of the evening was Marie Louise Rosenthal, who has given 15 years of volunteer service to the Museum. William Fawcett, head librarian, who has been her supervisor during that time, spoke about Marie's many contributions as a Library volunteer. Mrs. Rosenthal has primarily worked with the conservation of bindings, an extremely important function in the library. Box-making for fragile items was another specialized job she has undertaken. Mrs. Rosenthal has also served the Museum in another volunteer role, as a member of the Women's Board.

Lorin I. Nevling, Jr., director, also expressed his thanks to the 1984 volunteers, and presented those four volunteers who had contributed over 500 hours in service to the Museum, with gifts of appreciation.

Joyce Matuszewich, volunteer coordinator, thanked both volunteers and staff for their cooperation during the year. "Although years of service and numbers of hours given are measurable indications of the value of volunteers to the Museum," said Mrs. Matuszewich, "the unmeasurables, like the pride volunteers take in their jobs and the satisfaction staff members take in the important work accomplished by volunteers—these reflect the true value of a volunteer program."

Volunteers work throughout the Museum—in scientific and administrative areas as well as in the public areas such as the Education Department and Membership. Volunteers catalog, label, prepare specimens, prepare charts, maps, and scientific illustrations, do research, edit, type, and file. They also conduct school tours, give programs to the public, and assist on special events.

Volunteers Who Have Served 500 Hours Or More

Sophie Ann Brunner, Reptiles: skeleton preparation, organization, and maintenance.
Margaret Martling, Botany: worked with reprint collections, helped select negatives for type photograph program, updated nomenclatural indices, helped process plant collections from Latin America.
David Matusik, Insects: preparation of butterflies and moths from backlogged material to condition suitable for research.
Llois Stein, Anthropology: researched and cataloged Oceanic, Malaysian, and African collections, assisted in Pacific storeroom reorganization, assisted with cataloging the gamelan collection.

Volunteers Who Have Served 400 Hours Or More

Sol Century, Anthropology: cataloging, general projects in Asian Division.
Patricia Dodson, Anthropology: manuscript editing and proofing, correspondence, and research.
Ingrid Fauci, Reptiles: translated French into English for staff and a translation project organized by one of the professional herpetological societies.
Connie Koch, Development and Public Relations: computerized funding searches and development of funding source files for Grants office; updating mailing lists, organizing clipping files, special mailings for Public Relations.
Dorothy Oliver, Library: filed new book cards; retrieved books for visitors and assisted in Reading Room; special projects.

Volunteers Who Have Served 300 Hours Or More

Jackie Arnold, Education: weekend clerical assistance, Place for Wonder; assisted in special events and children's workshops.
Dennis Bara, Membership: weekend Membership representative.
Warren Batkiewicz, Insects: intern, prepared drawings of research material for use in scientific publications.
Trace Clark-Petravick, Anthropology: textile conservation, worked with pre-Columbian textiles.
Jeannette DeLaney, Anthropology: textile conservation, worked with pre-Columbian textiles.

300 Hours (continued)

Joseph Levin, Geology: finished cataloging John Clark Collection of Oligocene mammals, assisted in curating collection of Pleistocene mammals.

Carolyn Moore, Anthropology: researched special projects in Asian Division.

Forman Onderdonk, Education: conducted tours in the animal and Indian halls, Pawnee Earth Lodge and Place for Wonder; assisted with children's workshops and special events.

Gary Ossewaarde, Education: researched and conducted weekend tours on Egypt and China; assisted on special events and workshops.

Jean Seiler, Geology: Research in variation of dental characteristics of neotropical primates, photography, measurements of teeth and jaws, statistical analysis of data.

Harold Waterman, Education and Reptiles: Maintained reprint card catalog and performed other library duties, compiled information from catalog data in response to inquiries in Reptiles; greeted school groups, gave "Museum Favorite" programs to groups in Education.

David Weiss, Anthropology: Administrative assistant in Asian Division.

Laury Zicari, Exhibition: fabrication and installation of exhibits.

1984 Volunteers

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Charles Braner
James E. Burd
Louva Calhoun
Sol Century
Trace Clark-Petravick
Connie Crane
Jeannette DeLaney
Patricia Dodson
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Peter Gayford
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Herta Newton
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Philip Pinsof
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William Rom
Susan Saric
Sara Scherberg
Abraham Simon
Llois Stein
Cathy Tlapa
Robbie Webber
David Weiss

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Diane Dillon
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Mary Lou Grein
Nancy Harlan
Patricia Klick
Margaret Martling
Naomi Pruchnik
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Carol Schneider
Daniel Snydacker
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Lorraine Thauland
Lillian Vanek
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Helen Ruch

Bulletin

Hermann Bowersox

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Lucia Barba
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Miriam Goldsmith
Helen Gornstein
Evelyn Gottlieb
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Karen Grupp
Sylvia Haag
Michael Hall
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Shirley Hattis
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Mary S. Nelson
Natalie Newberger
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Ernest Reed
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Rhonda Rochambeau
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Laury Zicari

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Roy Yanong

The Comet Cometh

by Edward J. Olsen
Curator of Mineralogy

Sixteenth-century woodcut depicting the arrival of the comet of 1596.

The Chinese called them "broom stars." Europeans called them "hairy stars." At the appearance of one, people's hearts were often filled with fear and foreboding. To King Harold of Britain the 1066 appearance of Halley's Comet was a bad sign, and he was right — William of Normandy soon arrived to conquer him. Napoleon regarded the great comet of 1811 as a good sign—and he was wrong! During the next winter his troops met bitter defeat in Russia. For whenever a comet appears it cannot be ignored. It is such a weird object that humankind must make a big deal of it—one way or another.

Comets will never be commonplace in human experience even though they are very commonplace in the antics of our solar system. Even experienced astronomers find comets of great interest, for in them are to be found implications about the birth of the solar system, the origin of life, and possibly the occasional catastrophic destruction of much life on our planet.

By late November of this year, Halley's Comet will return to the vicinity of the earth from the far reaches of space, just beyond the orbit of planet Neptune. It will be the second time it has appeared this century; the last time was in 1910. In the twenty-first century it will appear only once—in 2061.

The 1910 appearance was spectacular, but the 1985-86 appearance is going to be one of the worst for viewing by eye in a thousand years. As you can see from the table (p.00) the best time to see Halley's Comet with the naked eye will be only from the middle of this

coming December to early January. From then until early March (1986) it will appear so close to the bright sun that it will be blotted out. Then again from early March until early May, naked-eye viewing will be possible if you are far out in the country, away from all lights, and the moon isn't up.

The reason for the poor showing this time is the earth's position in its orbit around the sun, relative to Halley's orbit. The comet this time crosses the earth's orbit on the opposite side of the sun. In 1910 Halley ren't even sure whether comets were out in space or within the earth's atmosphere. The Greek philosopher Aristotle, for example, was convinced they were atmospheric aberrations. Halley had a friend at Cambridge University named Isaac Newton, who had recently created a mathematical method for describing the motions of objects in space, gravitationally attracted to one another. To do this Newton had to invent a new form of mathematics, which he called *fluxions*, but we today call *the calculus*. (This calculus was also invented at exactly

HALLEY'S COMET VIEWING CONDITIONS

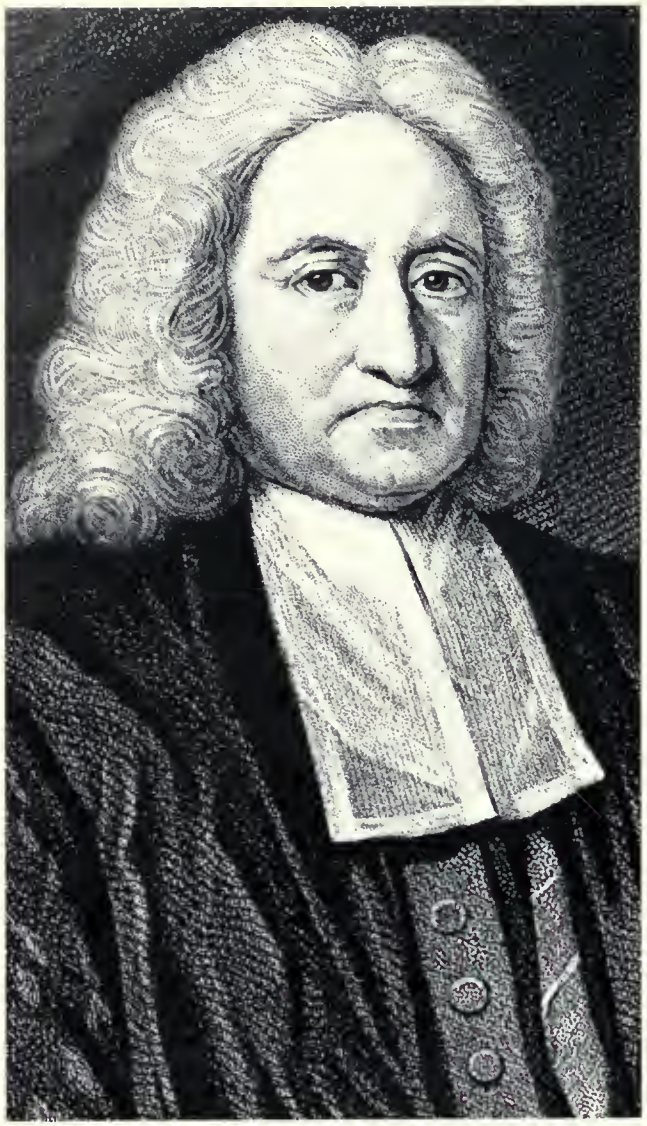
Time	Viewing
1985, Jan–Oct. 15	Telescope only
1985, Oct. 15-31	Very strong binoculars (7x50 or better)
1985, Oct. 31-Dec. 15	Standard binoculars (7x35, 8x30, etc.)
1985/1986, Dec. 15–Jan. 15	Eye (away from city lights)
1986, Jan. 15–Feb. 28	Too close to sun—can't be seen
1986, Mar. 1–May 1	Eye (away from city lights)
1986, May 1–31	Standard binoculars
1986, June 1–July 1	Very strong binoculars
July 1, 1986—1988	Telescope only—gradually fading

crossed the earth's orbit close to the position of the earth at the time. Also in 1985-86, because of the winter/early-spring passage of the comet the best viewing (however poor) will be in the Southern Hemisphere—South Africa, South America, Australia, and the South Pacific. In spite of all the problems for good viewing, 1985-86 is going to make comet watchers out of a lot of people—as this comet has done 28 times over the past 2,227 years since the first recording of its passage by the Chinese in 240 B.C.!

Usually a comet is named after the first person to spot it. So there are comets with names like Bennett, Kahoutek, Morehouse, Enke, Biela and DeCheseaux. When more than one person reports a new comet at the same time it gets a hyphenated, and sometimes sort of funny-sounding name: Comet Mitchell-Jones-Gerber, Comet Ikeya-Seki, and Comet Schwassmann-Wachmann, for example. Comet Halley (incidentally Halley rhymes with "valley," not with "daily," as you'll often hear) got its name a different way. Were it named for its finder it would have a Chinese name.

Edmond Halley (1656-1742) was an English astronomer and mathematician. For part of his life he was a professor at Oxford University and Royal Astronomer. In 1682 a comet appeared in the sky and he became fascinated with it. At the time there was a huge ignorance about comets. In ancient times some learned men were the same time by the great German mathematician Leibnitz, and there was, for some years, bad feeling between Newton and Leibnitz over who did it first—but back to our story.) Newton's methods were ideal for analyzing the (then) puzzling orbits of comets. These were times long before any kind of calculating machine, and all these tedious calculations had to be done by hand. Halley undertook to learn Newton's methods and compute the orbits of three comets that had been measured telescopically in 1531, 1607, and 1682—when he had sighted the comet himself. He concluded that the orbits of these three comets were almost identical and, further, that they were all really the same comet returning periodically every 76 years from deep interplanetary space to make a swing around the sun. He wasn't the first to suggest that some comets were periodic (Robert Hooke, the British physicist, had already guessed that), but he was the first to prove the idea with calculations. He predicted that the same comet would return late in 1758. Unhappily, he didn't live to see the event, but almost on schedule—in March of 1759—it arrived and swung around the sun. This comet has been called Halley's Comet ever since.

The fact that Halley didn't precisely calculate the passage time became a new puzzling feature. In fact, modern (computer-driven) analysis of this comet's passages projected backwards over 30 centuries reveals that



English astronomer-mathematician Edmond Halley (1656-1742) was the first to provide a mathematical basis for the periodic return of comets. Courtesy the Bettman Archive.

the period varies from 68 to 79 years, and its orbital plane fluctuates a shade under 2°. These variations are due in part to the presence of the giant planets, Jupiter, Saturn, Uranus, and Neptune, which, if the comet passes near enough, can gravitationally tug it out of its old orbit causing it either to retard or speed up. With these small uncertainties, one might ask, how can we be so sure it's going to arrive on schedule this time? The answer is, it's been spotted already. On October 16, 1982 astronomers David Jewitt and G.E. Danielson of the California Institute of Technology recorded its approach on a large telescope camera. It's on its way!

Comets have always been a source of deep superstition in the western world (not, however, in China). They've been regarded variously as good luck, bad luck, foretelling periods of rotten weather or personal illnesses, or as a portent of death for some person of royalty:

"When beggars die, there are no comets seen.
The heavens themselves blaze forth
the death of princes."

—W. Shakespeare, from *Julius Caesar*

When one is used to looking at a sky that parades past a familiar family of objects—sun, moon, a variety of stars and planets, and the occasional "shooting star" (*i.e.*, incoming meteorite)—the sudden appearance of a starlike object with an elongated tail that, for some unusual comets, spans over 100° of arc, can make you jittery if you're superstitious, ignorant, or both.

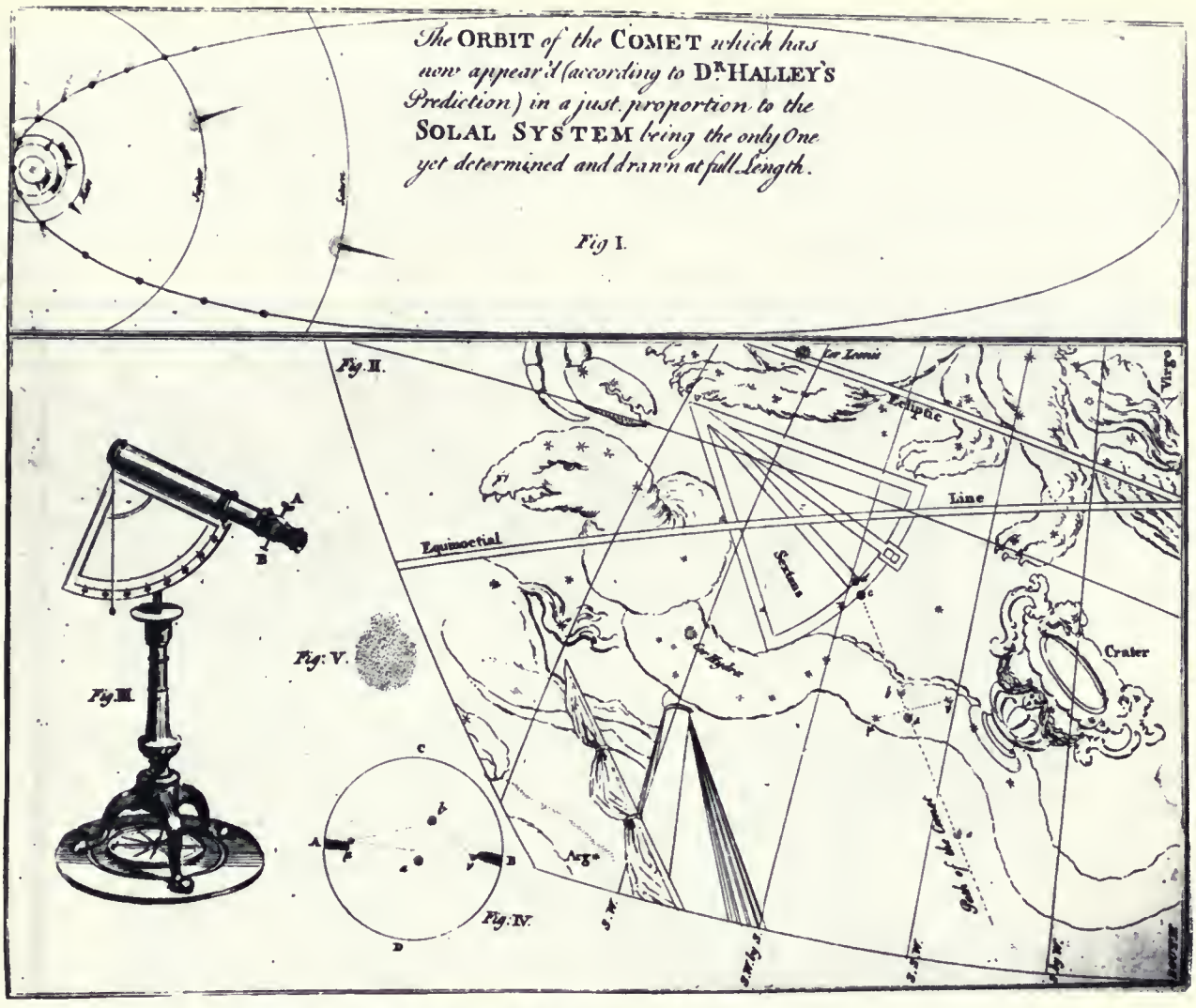
For a fact, the earth can be smacked by a comet traveling in a collision orbit, and the effect can be devastating depending on the size of the comet and where on earth it hits. In 1908, for example, a very small comet impacted the earth in, fortunately, a remote region of Siberia near the Tunguska River. Trees were flattened over an area 40 miles across! It had an energy equivalent to 10 million tons of TNT! In a populated region it would have been the worst natural disaster in history. For Comet Halley, however, we have no fear it will hit earth. Its orbit doesn't intersect the earth's orbit. At worst, it can only be a near miss!

In 1910 Halley's Comet caused a fearful uproar when it was predicted (correctly) that the earth would pass within 5 million miles of its head and would be bathed partially in its tail. Some people prepared for the end of the world. Others sealed themselves into rooms and stuffed door sills and keyholes with rags to keep out the noxious gases they expected would fill the air. Indeed, one chemical that does come off comets is highly toxic cyanogen gas. However, our thick layer of atmosphere is more than enough to keep such gases from penetrating to the surface of the earth. Besides, the great bulk of the gas in comet tails is plain water.

The 1910 passage of the comet (known officially as P/Halley—the P is for *periodic*—not all comets are) added some new facts to our knowledge about these strange objects. In 1910 P/Halley passed directly across the face of the sun from earth's point of view. Despite intense study, there was no black dot to be seen against the sun's disk. Conclusion: it isn't very big at all! Current estimates make Halley out to be only about 5.5 miles across. Its gaseous outpourings make it appear larger than it is. Also, earth's passage through part of the tail produced no observable or measurable result. As already suspected, the tail is very tenuous.

To get some idea of what these things are made of and how they got to be the way they are, a lot of different comets had to have been studied.

First off, it is known that comets begin to glow only when they approach to within about 500 million miles of the sun (over five times farther than the earth's distance from the sun). The glow consists of gases—mainly water—that the sun's energy vaporizes off them. The



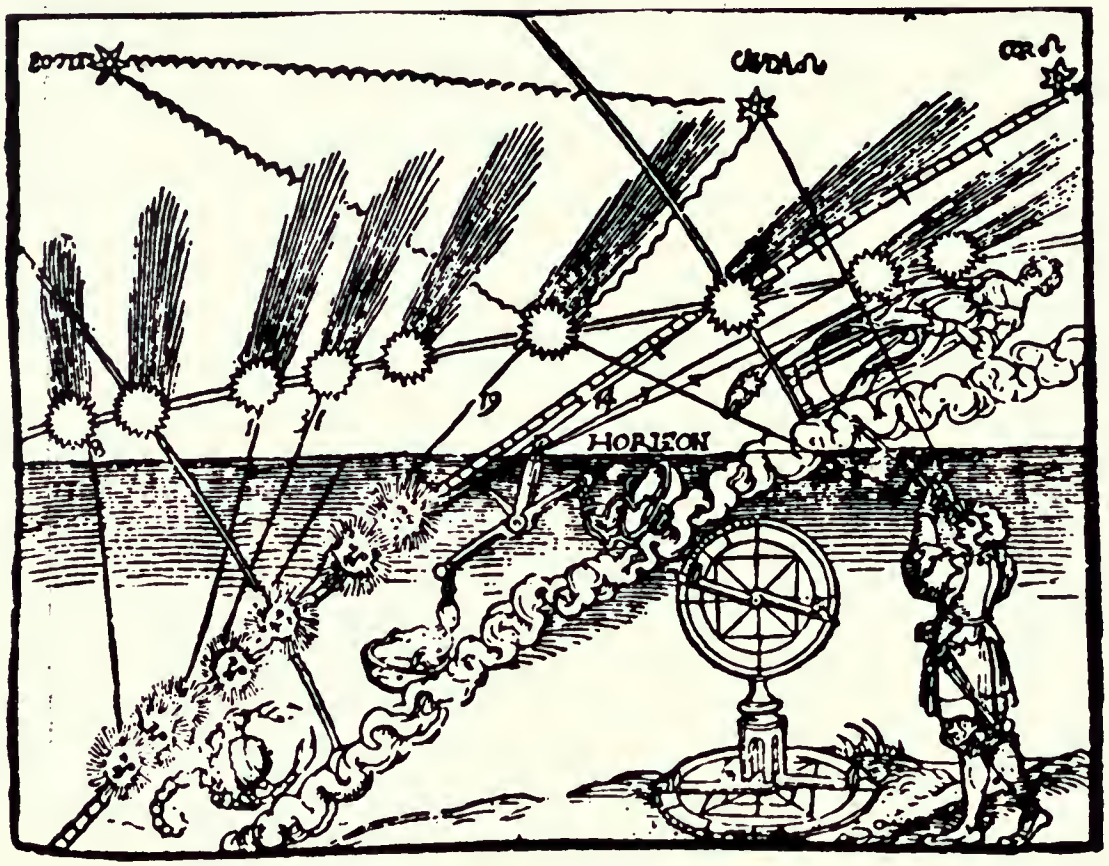
Early diagram of the orbit of Halley's Comet, based on Halley's calculations. Courtesy the Bettman Archive.

Drawing based on section of the 11th-century Bayeux Tapestry, showing Halley's Comet on the eve of the Battle of Hastings (1066). The "caption" at the top may be loosely rendered, "The men marvel at the star." Courtesy the Bettman Archive.

ultraviolet part of the sun's light is able to break up some of the gaseous molecules and the complex processes of recombinations of molecules causes light to be given off. Although some people have reported comets with different colors of light—red, blue, green—this appears to be due more to their imaginations or to effects from our own atmosphere. The light is white.

The brightness of comets varies considerably. The great majority are very faint and can be seen only with good telescopes. In fact, comets pass the earth every year, observed only by astronomers and not by the public. Comet P/Enke, for example, returns every 3.5 years! Many small comets go unnoticed by anyone, even astronomers. A couple have been accidentally discovered passing close to the sun during solar eclipses when the sky, next to the sun, is dark for a few minutes. Without the eclipses they would never have been seen. On the other hand, a few rare ones are so bright they can be seen in the daytime! Comet DeCheseaux, which has been seen only once—in 1744, was like that. Several comets have been observed to vary rapidly in brightness over short periods of time—long tails forming, fading, and spurting out again.

As the gases vaporize, a glowing envelope of light, known as the *coma* develops around a comet. Getting closer to the sun, the effect of the blast of radiation and atomic particles that stream from the sun's surface (the *solar wind*) push the gases backward and the *tail* develops. When the comet swings around the sun the tail, of course, always points away from the sun, the direction the solar wind is pushing it. So when the comet is heading back out into space, going away from the sun, it does so tail first. The Chinese astronomers realized this a couple of thousand years ago; Europeans didn't figure it out until the sixteenth century.



Sixteenth-century engraving of astronomer Peter Opianus observing comet of 1532. Courtesy the Bettman Archive.

A lot of effort has been expended, using a variety of optical devices, to study the make-up of the coma and tail—all we can see of a comet when it gets into the vicinity of the earth. Besides gases, dust grains stream off all comets and, because of the complex nature of the sun's radiation, some comets have two tails, a straight one made mostly of dust grains and a separate, curved one made mostly of gas molecules. A few odd comets have four, six, or twelve tails radiating off like feathers. No one has a good explanation for the extra tails.

Many comets have elongated orbits that take them out to the edge of the solar system over long periods of time. Halley is one of these. Others have orbits that are nearly circular and travel at about the same distance away from the sun all the time, continually glowing. About half of all known comets have motions about the sun revolving in the same direction as the planets. The other half travel in the opposite direction—called *retrograde* (Halley again). A few have orbits that indicate they

will make only one swing around the sun and then be flung out into interstellar space—out of the solar system, never to return. There are those that have orbits lying in the plane of the orbits of the planets (called the *ecliptic plane*). Others have orbits inclined to that plane, like Halley at 18° inclination. This means that when Halley is at its farthest point from the sun it is almost a billion miles out of the plane of the ecliptic.

emerged that seems to fit the facts. It is the result of decades of comet studies by American astronomer Fred Whipple. It's called "the dirty snowball" hypothesis.

Think of a day after a light snowfall. The neighborhood kids get out in a gravel and dirt playground to romp around. The snow is only a few inches deep. Suddenly one of them scoops up some snow, packs it into a snowball and flings it at you. Smack! Wow, that hurts!

French caricaturist Honoré Daumier (1808-79) has a spectator lamenting, "Oh, comets! . . . they're always a bad omen. No wonder that Madame Galuchet just took up and died last night!"

Certainly the most fascinating feature of comets is the reaction of some of them as they pass close to large bodies and suffer gravitational stresses. Halley appears to be pretty firm stuff and doesn't show any serious effects. Others, however, appear to come "unglued." Comet Ikeya-Seki appeared to break into two pieces as it passed the sun on October 21, 1965. In 1846 Comet P/Biela was reported to have broken in two, one part fading rapidly in brightness. Comet Morehouse broke in two on October 15, 1908 but the pieces stayed close together in space. Comet Brooks was observed to break apart as it passed between the planet Jupiter and one of Jupiter's many moons, Amalthea, in 1889. Apparently the gravitational pull of Amalthea on one side and giant Jupiter on the other was too much for it. The strength of the solid material of the comet wasn't enough to hold it together.

Putting all observations together, a picture has

Sure, the snowball is only part snow. The rest is gravel and dirt he scooped up with it. Well, according to Whipple, that's what a comet is.

It's ice laced through with bits of rock, maybe even a huge hunk of rock in the middle, and lots of dust. The ice has frozen within it other "ices"—that is, other gases frozen by the intense cold of deep space. The "snowball" may be a few hundred feet to many miles across. In this game giant snowballs are easy to make. You make them the same way you make planets like the earth.

Most people would expect an ice ball to melt completely in passing the sun. A small enough one would, of course. Large ones, like Halley, lose over six or seven feet in their diameters each time they make a trip into the center of the solar system and around the sun. They get smaller and smaller and eventually disappear, except for any large masses of rock that were held in the ice. Some comets, in fact, give off little gas, glow feebly, and have

Halley's Comet seen in 1910 from Yerkes Observatory, Williams Bay, Wisconsin. Photo by F. E. Barnard. Courtesy the Bettman Archive.

only a faint coma and no tail. These have lost almost all their ices and gaseous matter and are reduced to rocky masses. A few of the rocky asteroids (minor planets that orbit the sun) give off no light at all have cometlike orbits; they are suspected of being comets that long ago lost all their ices and gases.

As comets melt, they release bits of rock and lots of dust. The dust and small rocks lag a little behind, forming a trail in the wake of the comet. Long after the comet is out of sight, the trail is still drifting along the orbital route. If the earth should pass through such a trail the bits of dust and rock are pulled by earth's gravity into the upper atmosphere where they burn up. These are called *meteor showers*. A number of annual meteor showers coincide with the orbits of known comets. Other annual meteor showers cannot be associated with any currently known comets and are suspected of being all that's left of periodic comets that wasted away long before the beginning of recorded history.

A lot of our scientific "knowledge" about comets is obviously only educated hypothesis and speculation. Halley arrives for the first time in the Space Age that has given us a taste of space exploration: manned lunar landings, unmanned landings on Mars and Venus, probes past Mercury, Jupiter, and Saturn. Clearly, means now exist to make close-up measurements of this famous comet.

The most ambitious plan (which failed to be carried out) was that of the United States. A new type of space engine was to be developed, called the *ion drive*. Because of Halley's retrograde orbit it is difficult to get into synchrony with it. Any rocket launched from earth has, necessarily, as a large part of its initial motion the velocity of the earth in its orbit. This motion is, of course, opposite that of this retrograde comet. The ion drive vehicle was a nifty scheme. The vehicle would be launched in the normal fashion and head out toward the direction of approach of the comet. The ion drive would steadily retard the vehicle, slowly stopping it, then accelerating it back in the direction from which it came — that is, in a retrograde path. With everything timed properly, as Halley came along, the vehicle would be put into a nearby orbit with it, adjusting the velocity so it would "park" near the comet. Observations, measurements, probes, samplings of gases and solids would all be made at low relative velocity. Superb detailed measure-

ments could have been made. The plan was scrapped, however, because of budget cuts to the space agency (NASA) early in Mr. Reagan's first administration.

As it now stands, the U.S., once a leader in space, will have no major close-up study of this comet. Most of the significant studies will be made by ESA (the European Space Agency), Japan, and (of course) the USSR.

The Russians will, in fact, have the first close encounter with Halley. They have two probes, *Vega 1* and *Vega 2*. *Vega 1* will pass about 6,000 miles away from the head of the comet on March 6, 1986. *Vega 2* will pass by it three days later at about the same distance. These probes are designed to take TV pictures and measure dust, gas, and heat from the comet.

The ESA probe has been named *Giotto*, after the Italian painter, Giotto di Bondone (1276?-1337), who depicted Halley's Comet as the Star of Bethlehem in one of his frescoes, the *Adoration of the Magi*, in Padua. He had seen this comet when it appeared in 1301. The *Giotto* probe is very ambitious. A total of ten groups of measurements will be made on the chemical and physical make-up of the comet, including, of course, color images of it with, it is hoped, resolution of about 30 feet. The experiments are being put together by laboratories in Germany, France, England, and Switzerland. *Giotto* is to be launched in July of 1985 and encounter the comet at close range in a four-hour period late on March 13 to early March 14, 1986. Because the comet and *Giotto* will be passing each other in opposite directions, the total encounter velocity will be about 152,000 miles per hour! Measurements will have to be made very fast.

The aim of *Giotto* is to go through the tail and the coma, passing to within 600 miles of the solid body of it (the *nucleus*). Such a close pass creates big concern for the whole mission. Dust grains and bits of rock can hit the *Giotto* probe faster than rifle bullets and cause mechanical damage or rotate the vehicle, turning its data transmission antennae away from the earth (it will take 8 minutes for a bit of message sent from the probe to reach earth stations). If all goes reasonably well even this fast grab at measuring Halley's properties should increase our real knowledge about this comet, and of comets in general.

The Japanese probes, *Planet A* and *MST-5*, will make initial measurements at great distances from the comet from late January to mid-February, 1986. Then on March 8, *Planet A* will pass closer, about 125,000 miles from the head of the comet.

In order to get into the act, at least a little, the U.S. will aim a *Pioneer* vehicle, orbiting Venus, to snatch a few measurements on Halley as it passes by. In addition, a number of U.S. space scientists are involved with some of the experiments on the *Giotto* probe, and (surprisingly) a package of instrumentation from the University of Chicago will be carried aboard the Soviet missions.

The 1956 book Wonders of the Heavens, *by Kenneth Heuer, offered this artist's (Matthew Kalmenoff) conception of Halley's Comet as viewed 30 years hence, in 1986. Courtesy Dodd, Mead, & Company.*

With even moderate success a lot will be learned this time. For those who are poets at heart, cool scientific measurements may threaten to diminish some of the mystery and romance of this comet. That, for certain, will not happen. We have only to remember that our first close-up views of objects seen previously as distant patches of light have increased the mystery and wonder of them: the unexpected huge dry watercourses that ramble across the now waterless planet Mars; the inexplicable braided twists in the rings around Saturn; the lack of any similarity among the once-thought-similar moons of Saturn and Jupiter; the sodium-spouting volcanoes on Jupiter's moon, Io. Each closer view answers ancient questions and piles up new ones. It's all part of a master plan to protect human scientists from complacency and smugness. The mystery goes on, and that, surely, is the joy of it.

African Art, Paleoanthropology, and Fellowship: Themes of Two Founders' Council Affairs

On March 8, prior to the public opening of the Art of Cameroon exhibit, Founders' Council members and their guests were treated to a special evening of fun, friendship, and education. Following a beautiful reception in the Founders' Room, Guest Curator Tamara Northern provided a brief introduction to the Cameroon exhibit. The group then toured the Cameroon hall, with Dr. Northern furnishing fascinating commentary on the history of this magnificent assemblage of African art.

World renowned paleoanthropologist Dr. Donald Johanson delivered a compelling lecture to a standing-room crowd in Field Museum's Simpson Theatre on March 23. Following his presentation, Dr. Johanson, who discovered the 3.5-million-year-old human fossil "Lucy," joined Founders' Council members and other Museum contributors for a reception in the Founders' Room. The enjoyable Saturday afternoon function was highlighted by Dr. Johanson's inspiring remarks about his high regard for Field Museum, and the invaluable support the Founders' Council provides toward strengthening the Museum.

Ron Testa

Ron Testa

Ron Testa

Ron Testa

Center: *Mr. Howard Storch and Mrs. Burton W. Hales;* clockwise from upper left: *Mr. and Mrs. Kenneth Montgomery and unidentified guests; Mr. and Mrs. Mark Rosenberg; Mr. Ejedepang-Koge (of the Cameroon Embassy), Dr. Tamara Northern, and Reception Chairman Robert D. Kolar;* (L. to R.) *Col. John B. Naser, unidentified guest, Field Museum Trustee Robert O. Bass, and Dr. Donald Johanson; Reception Chairman Henry T. Chandler, Dr. Johanson, and Founders' Council Chairman Thomas J. Eyerman, who is also a Field Museum trustee; Field Museum Trustee Earl L. Neal and Mrs. Neal. The upper five photos are of the Cameroon reception, the lower two of the reception for Dr. Johanson.* 83893

TOURS FOR MEMBERS

Stanton R. Cook, courtesy *Chicago Tribune*

China and Tibet

August 10-September 1
$5,975 (double occupancy)

Field Museum's journey through the Orient provides an evocative contrast of cultures. From the bustling streets of Hong Kong, where we find a mine of curios in its well-stocked shops, we travel into the serene beauty of traditional China, to Kunming. This mountain city rests on the shores of Lake Dianchi, which ten centuries of poets have likened to a pearl. The palace of San Qing has 1,333 steps climbing up to the Dragon Gate and on, to the splendid stone chamber called "Leading to Heaven." A day trip takes us to the Forest of Stone, 64,000 acres of up-thrust limestone pinnacles, where we may visit one of China's minority peoples, the Lu Nan Yi.

Lhasa, the snow-shrouded capital of Tibet inspires awe in the visitor. Here, we see modern factories and communes contrasting sharply with the mystic retreats of monks. The Dalai Lama's palace, one of the architectural wonders of the world, is thirteen stories high, with 999 rooms, 10,000 chapels, and 200,000 golden images. An excursion by coach reveals a wild, steep, and rugged country of breathtaking beauty. Along the Tsampo river, past glaciers and waterfalls, we travel through colorful villages, viewing the native crafts and precarious lifestyle of the Tibetan people. At last we find the glorious city of Shigatse, home of ancient art and history. Inside the Trashilunpo Monastery is the Goddess Palace, the colossal gold-plated Maitreya Buddha, and the throne of the Panchen Lama, all worked in silk brocade.

One of the trip's many highlights is a visit to Xian, where the vast life-size terra cotta army was discovered in 1974. We also see Ban Po village where the Neolithic site of Yan Shao (6,000 B.C.) was discovered. Beijing (Peking) offers us the Forbidden City with its dynastic treasures on display. The Gate of Heavenly Peace rests on the square of monuments to the People's Heroes, and no one would want to miss the 4,000-mile-long Great Wall. Nearby, the Valley of the Thirteen Tombs, with its rows of crouching carved animals beckons us to the burial site of the Ming emperors. The Summer Palace and shopping conclude our visit to China.

Finally, we enjoy a day of sightseeing in Narita, Japan, before boarding our homebound flight.

Mr. John Brzostoski, professor of Oriental art history at New School for Social Research in New York City, is our lecturer. A specialist on Tibet, he is fluent in Mandarin, has written numerous articles on the art of Asia, and lectures widely. He is founder and director of the Center of Oriental Studies in New York.

Kenya

September 6-23
$3,695 (double occupancy)
Rift Valley optional extension through October 1
$1,085 per person (double occupancy)

An exciting, adventurous experience awaits you in mysterious Kenya. Take a safari through some of the world's finest game reserves during the spring migration. Follow the steps of Ernest Hemingway, Theodore Roosevelt, and Robert Ruark to the foot of Africa's highest mountain, snow-capped Kilimanjaro. At its base lie five distinct habitats justly famous for such big game as lion, wildebeest, and rhino. In Tsavo National Park, East Africa's largest, great herds of elephant roam free, sometimes right up to the waterhole easily observed from Kilagumi Lodge. At Mzima Springs enjoy the aquatic ballet of hippo, fish, and crocodile from an underwater viewing tank. Aberdare Park boasts the giant forest hog, buffalo, and the rare bongo antelope.

Around the rugged northern slopes of Mount Kenya through local villages where you can bargain for beautiful bracelets of twisted copper, you come to Samburu River Lodge whose terraces overlook the Uaso Nyiro River, its crocodile and elusive leopard. The nearby game reserve is a photographer's paradise and the specially equipped safari vehicles provide clear shots of zebra, giraffe, and gazelles, and of the vivid, contrasting colors of sky, bush, and sand. On to Mount Kenya Safari Club, made famous by actor William Holden, you can relax beside the mountain in magnificent gardens, fishing, golfing, playing tennis, swimming, or riding horseback.

One of the safari's many highlights will be a visit to the Masai Mara Game Reserve of rolling savannah plains. This is the very best reserve in Kenya and from your luxury safari camp you can see far across vast grassland spotted with acacia woodlands and thickets of scrub. Impala, giraffe, Grant's and Thompson's gazelle make their home here. Lions move restlessly in search of a kill.

In Narok, you may wish to buy Masai wares, such as belts, spears, wooden head-rests, and bead necklaces. In addition, Nairobi is a mine of souvenirs and many happy hours can be spent in the colorful African Market.

As an option, bird lovers may wish to travel to Lake Nakuru in the Great Rift Valley, where thousands of flamingos make their home. Lake Naivasha with its papyrus fringe supports over 500 species of exquisitely colored birds.

Audrey Faden, a native of Kenya, will be your guide. She was Education Officer at the National Museum of Kenya and has been a Field Museum volunteer for many years, conducting field research and collecting plants in Kenya. She is a seasoned guide and lecturer and is well-versed in the wildlife, plant life, and ecology of Kenya. Ms. Faden is eager to share her homeland with you.

If you have an interest in joining our Kenya Safari adventure, please call Dorothy S. Roder at 322-8862 for a detailed itinerary. Information about this and other tours may also be obtained by writing the Tours Department, Field Museum, Roosevelt Road at Lake Shore Drive, Chicago, Il. 60605.

The Field Museum of Natural History
Membership Department
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605-2496

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

July/August 1985

Biennial Report 1983-1984

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July/August 1985
Volume 56, Number 7

Field Museum of Natural History Biennial Report, 1983-1984 **3**

COVER

Natural history specimens—a tiny jar, a flower, a stone, and a butterfly—representing Field Museum's four main scientific disciplines: anthropology, botany, geology, and zoology. Special thanks to Polly Breul, Gene Olson, Stefan Suchec, and Willy Watkins, who graciously provided their hands for the cover photos. Photography and design by David M. Walsten.

On Fridays Watch for Researchers At the Place for Wonder

This summer get a glimpse of some activities which usually go on only behind-the-scenes. Meet and observe Field Museum staff working with specimens from research collections. Friday afternoons, 1:00-3:00, Place For Wonder.

July	5	Observe bird specimens being prepared for research.
	12	Compare various saber-toothed skulls.
	19	Watch insect specimens being mounted for research collections.
	26	Explore mysterious plants we eat.
August	2	Observe your name being written in Egyptian hieroglyphs.
	9	Learn techniques the Museum uses to maintain the books in its libraries.
	16	Study reptile skins and skulls.
	23	See a display of various weaving looms.
	30	Discover the process and art of decorating gourds.

Events

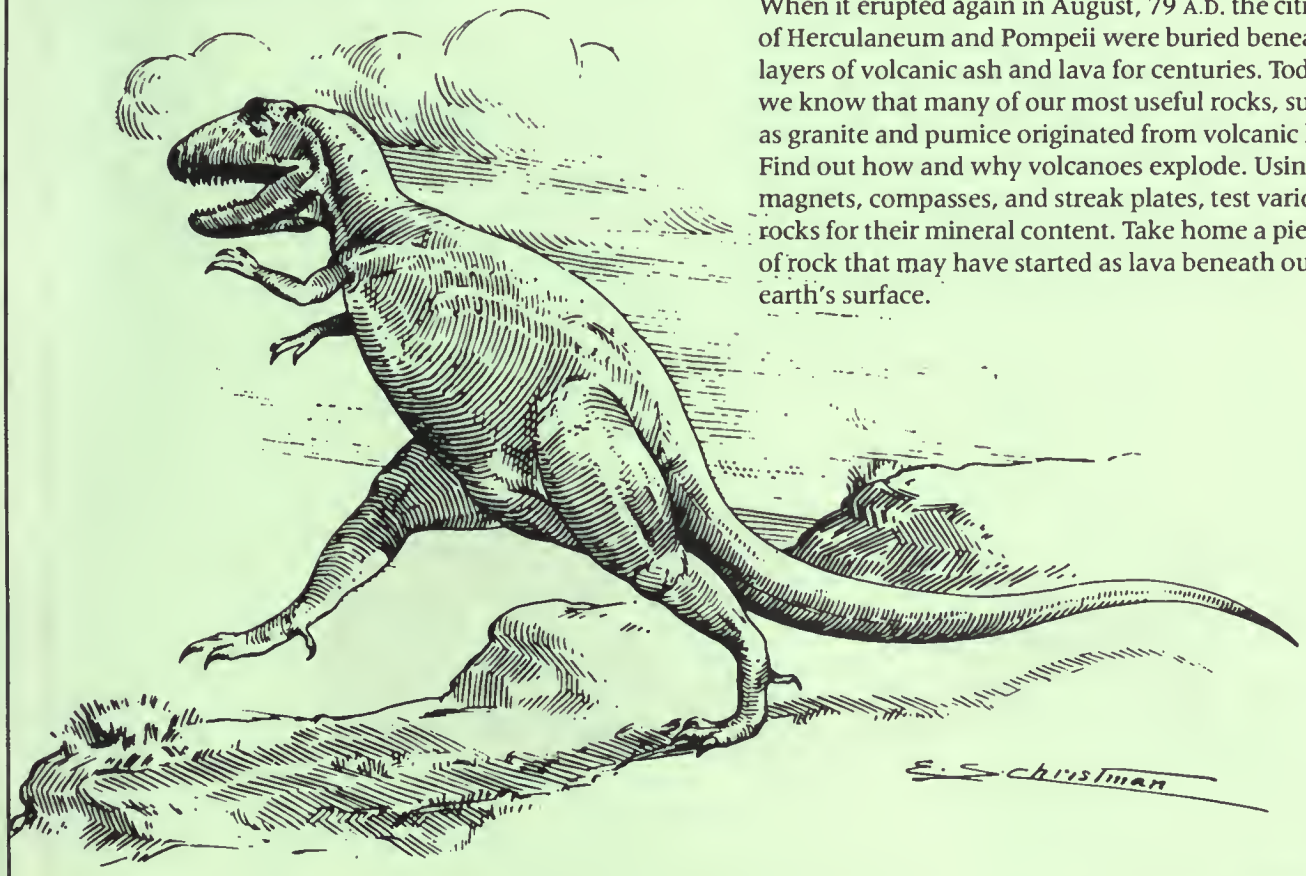
SUMMER FUN 1985

Workshops for Young People

Daily (except Monday)
July 2 to August 4

Beginning July 2, Field Museum offers more than 90 summer workshops for young people ages 4 to 13. Museum halls come to life through tours, demonstrations, science projects, and art experiences. Explore the world of the dinosaurs *Triceratops, Tyrannosaurus rex,* and *Dimetrodon*—and unlock the secrets of the past. Travel the plains with a Sioux Indian and earn a sacred feather. Learn the newest archaeological methods or reconstruct the fossil fish *Cephalaspis.* Anthropologists, zoologists, artists, dancers, and filmmakers bring their talent and expertise to create new, informative, and creative experiences.

Workshops are held throughout the Museum. Enrollment is limited and children must be registered in advance by mail. Call (312) 322-8854 for Summer Fun brochures, and up-to-date information about workshop availability.



FAMILY FEATURES

Tell a Story, Write a Play

Saturday and Sunday, July 20, 21; 1:00-3:00pm
Ecology Hall, second floor.

Dr. Doolittle, the Ugly Duckling, and Rudyard Kipling's *Just So Stories* are a few examples of the animal stories we enjoy today. Take a look at Field Museum animals from a literary point of view. Talk about the kinds of characters we would see if the animals in our exhibits came to life at night. Put a story together as a group. At home, write your own animal story and send it to us for possible use in *Animal Antics* this December 1985. Child's Play Touring Theatre plans to select a number of stories to perform on December 28 and 29 in Stanley Field Hall.

Volcanoes

Saturday and Sunday, Aug. 10, 11; 1:00-3:00pm
Ecology Hall, second floor.

Early people witnessed the eruption of Vesuvius in Italy, and thought it was the gods having a battle. When it erupted again in August, 79 A.D. the cities of Herculaneum and Pompeii were buried beneath layers of volcanic ash and lava for centuries. Today we know that many of our most useful rocks, such as granite and pumice originated from volcanic lava. Find out how and why volcanoes explode. Using magnets, compasses, and streak plates, test various rocks for their mineral content. Take home a piece of rock that may have started as lava beneath our earth's surface.

CONTINUED⇨

Events

WEEKEND PROGRAMS FOR JULY & AUGUST

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend in July and August. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

July

6 Saturday, 2:00 p.m. *Traditional China* (tour). Delight in the timeless imagery and superb craftsmanship of Chinese masterworks in our collection.

7 Sunday, 1:00 p.m. *Welcome to the Field* (tour). Explore the highways and byways of Field Museum while sampling some of its most significant exhibits.

14 Sunday, 1:00 p.m. *Chinese Ceramic Traditions* (tours.) Take a close look at 6,000 years of Chinese ceramic art.

20 Saturday, 12:00 noon. *Life in Ancient Egypt* (tours). Focus on the objects and practices which illustrate ancient life in the Nile Valley.

21 Sunday, 1:00 p.m. *Welcome to the Field* (tour). Explore the highways and byways of Field Museum while sampling some of its most significant exhibits.

28 Sunday, 2:30 p.m. *China's Wondrous Animals* (slide lecture). Look at real and imagined beasts in Chinese art, lore, and social life.

August

4 Sunday, 2:00 p.m. *Wonderful World of Plants* (tour). Take a botanical trip through jungles and deserts, mountains and seasides.

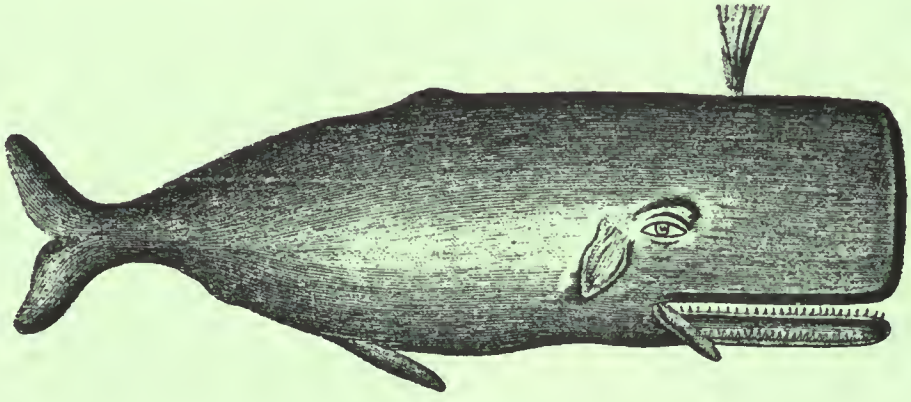
10 Saturday, 12:00 noon. *Continents Adrift* (demonstration). Why have fossils of similar dinosaur species been found on continents separated by vast oceans? The concept of "moving" continents is illustrated with enormous puzzle pieces.

17 Saturday, 11:30 a.m. *Ancient Egypt* (tour). Experience the mystique of ancient Egypt from everyday life to mummification.

18 Sunday, 1:00 p.m. *People of the Long House* (slide lecture). A look at the Iroquois, once the most powerful and influential of the Northeastern woodland tribes.

24 Saturday, 11:00 a.m. *Stories Around the World* (story telling). Listen to the tales children around the world have loved through the centuries.

These public programs are free with Museum admission and no tickets are required.



FIELD MUSEUM OF NATURAL HISTORY

BIENNIAL REPORT
1983-1984

People, not structure, make a great museum. Through the years the number of people who commit their time and funds to advance the Museum has greatly multiplied. This report is about the wonderful people who make Field Museum an exciting place to visit and learn.

David M. Walsten

ENDINGS and BEGINNINGS

David M. Walsten

Field Museum's two-man welcoming force at the North entrance were William Thompson (left) *and James Hammond, of Security and Visitor Services.*

THE FIELD MUSEUM suffered the loss through death in 1984 of two trustees, William G. Swartchild, Jr. and John B. Wilkins. Mr. Swartchild had served on the Board since 1966, for four years as chairman; Mr. Wilkins had been on the Board since 1969. Two life trustees also died during the biennium: William McCormick Blair, who had served on the Board from 1939 to 1972, and John M. Simpson, 1961-74.

Additions to the Board of Trustees were Mrs. Philip D. Block III, Frank W. Considine, Thomas J. Eyerman, Leo F. Mullin, Earl L. Neal, Robert A. Pritzker, and Patrick G. Ryan.

Eugene S. Richardson, Jr., curator of fossil invertebrates from 1946 to 1982, died on Jan. 21, 1983, only a few months after his retirement. Mary A. Hagberg, Field Museum registrar since 1967, died on August 16, 1984.

Additions to the staff included the following: Jimmie W. Croft, vice president of Finance and Museum Services; David W. Booz, manager of Financial Services; Arlene Kiel, administrator of Human Resources; Sherry L. Isaac, manager of Public Relations; Barbara I. Stuark, manager of the Museum Store, and Barbara Blum, assistant manager; Obie M. Collins, executive housekeeper; and Thomas B. Dugan, manager of Security and Visitor Services. The Department of Development staff gained records coordinator Leonard Evans, Development manager David G. McCreery, grants officer Glenn S. Paré, and corporate development officer Thomas D. Wilson. R. Lance Grande joined the Department of Geology as assistant curator of fossil fishes; Scott H. Lidgard joined Geology as assistant curator of fossil invertebrates.

Charles T. Buzek, formerly with Security and Visitor Services, joined the Office of the President as project coordinator, Centennial Directions. Promotions included Benjamin W. Williams's move to associate librarian and Rare Books librarian. Botany's Timothy C. Plowman was promoted to associate curator of vascular plants. Michael E. Moseley was promoted to curator of Middle and South American archaeology and ethnology; John E. Terrell was promoted to curator of oceanic archaeology and ethnology. Dr. Plowman was also appointed scientific editor of Field Museum Press (which produces *Fieldiana)*, while James W. VanStone, curator of North American archaeology and ethnology, was named assistant editor of the press.

Bruce D. Patterson, assistant curator of Mammals, was named chairman of Scientific Support Services (formerly designated Advanced Technologies Laboratory), while John J. Engel, associate curator of Bryology, was named supervisor of that group's scientific illustrators.

James Swantchild, 82727

William G. Swartchild, Jr.

The death of William G. Swartchild, Jr., former chairman of Field Museum's Board of Trustees, on March 15, 1984, was a loss beyond measure to Field Museum and its trustees, Women's Board, and staff.

Mr. Swartchild was born in Chicago in 1909. After graduating from Dartmouth, where he was elected to Phi Beta Kappa, he entered Swartchild & Company, a family business of which he was president at the time of its sale in 1973. Although he devoted a great deal of his time to public service throughout his life, his retirement from active business responsibilities freed him to devote full time in service to others—service which continued until his death.

He was elected a trustee of Field Museum in 1966. Typical of his sense of commitment to any institution with which he became associated, he quickly took an active leadership position among the trustees. In 1972-73 he was a member of a trustees' committee that developed a reorganized Board structure. Upon that reorganization he became vice chairman of the Board, heading the important Program Planning and Evaluation Committee. He was elected chairman of the Board of Trustees in 1978, serving in that capacity until 1982, at which time he was succeeded by James J. O'Connor. Following his chairmanship, Mr. Swartchild served as vice chairman, Internal Affairs, and as a member of the Nominating Committee.

William Swartchild had an extraordinary understanding of the dynamics of nonprofit institutions and the various constituencies comprising them. At Field Museum this was evidenced by the complete confidence in him on the part of the staff, Women's Board, and trustees.

He was active and equally respected in the American Association of Museums, serving as a vice chairman of the Trustees' Committee and as a member of the Commission on Museums for a New Century—a national planning effort for the years ahead. He was instrumental in preparing American Association of Museums' *Museum Trusteeship* and *Museum Ethics*.

Active for many years in the field of health care, Mr. Swartchild served as Trustee of Michael Reese Hospital, Children's Memorial Hospital, and McGaw Medical Centers and he was chairman of Children's and McGaw, as well as the Council on Governance of the Illinois Hospital Association, at the time of his death. He had served as a director of Blue Cross and Blue Shield of Illinois and of HMO Illinois. Mr. Swartchild was also a trustee of the Brookfield Zoo.

Beyond all of his achievement in business and philanthropy, he was a warm and thoughtful person who cared about people. He brought a quality of excellence and humanity to anything he touched. He was a model of dedication of personal energy for the public good. The City of Chicago is a better place because of William Swartchild's life.

DEVELOPMENT

Diane Alexander White 83598

Bowen Blair (center), first president of the newly organized Founders' Council, shown with Mr. and Mrs. Henry W. Meers, council members.

HIGHLIGHTING THE BIENNIUM in the area of support for the Museum was creation of the Founders' Council in 1983. In September of that year, an inaugural banquet launched the support club's program with a charter membership of approximately 250 of the principal donors to the Museum. The driving force behind establishment and recruitment for the Founders' Council was Bowen Blair, partner, William Blair & Company, and a Museum trustee. Mr. Blair also during 1983 served as the Council's first president. He was succeeded by Mr. Thomas J. Eyerman, partner, Skidmore, Owings & Merrill. Mr. Eyerman continued to build upon the strong foundation established by Mr. Blair, and the Founders' Council grew, not only in numbers, but in programmatic support. In 1984 the council initiated its Founders' Council Award of Merit program, through which a world-famous scientist is honored. The first award went to Stephen Jay Gould, Ph.D., distinguished scientist, educator and commentator, currently professor of zoology at Harvard University and curator of Invertebrate Paleontology at the university's Museum of Comparative Zoology.

The challenge to and goal of Founders' Council members is to pass on to Chicagoans of the 21st century a museum as vital and prestigious as original founders passed on to Chicagoans of this century. (Persons interested in joining this group should contact David G. McCreery, director of Development (312) 322-8877.)

The years 1983 and 1984 also saw increases in and new records set in support from all areas of the private sector: corporations, foundations, and individuals. 1984 was the final year of a second five-year support program entitled "Commitment to Distinction." At the end of the 1980-84 period, a total of more than $14,000,000 had been donated, including more than $3,000,000 in bequests.

Changes were effected in the organizational structure of the Development Office during the biennium, to enhance the capabilities, scope, and efficiency of the department: yet, with the expansion, fund-raising costs have been kept at a minimum in relation to annual operating budgets. A grants office was created in 1983, and Glenn S. Paré, who came from a similar post at Loyola University, was appointed grants officer. The Grants Office coordinates proposals from the scientific and educational departments of the Museum, seeking funds from governmental agencies such as the National Science Foundation. Special proposals to foundations and individuals are also generated by the Grants Office.

In order to carry out the departmental expansion expeditiously and efficiently, a "development audit" was conducted by an independent consultant firm, Donald A. Campbell & Company, Inc., in 1984. This study affirmed the direction the Museum and its Development Office had been taking, and made recommendations by which the department could "fine tune" the procedures. The internal audit by the Campbell Company was also made as part of a feasibility study, looking toward a major capital campaign for endowment and for repair and improvements of the building and exhibits.

Success of support efforts during the period was due in no small part to the vigorous leadership and selfless commitment of time and talent on the part of the

DEVELOPMENT

Board of Trustees, especially members of the Resource Planning and Development Committee of the Board. Robert O. Bass, retired vice-chairman of Borg-Warner Corporation and now chairman and president of the Borg-Warner Foundation, completed a term as chairman of this committee at the end of 1983. Richard M. Jones, vice chairman of the board and chief financial officer, Sears, Roebuck and Company, succeeded Mr. Bass. Prior to that, both Mr. Jones and Mr. Bass had each been chairman of the Corporations and Foundations Division of volunteer businessmen and executives; 1984 Corporations and Foundations Division chairman was Gene L. Harmon, vice president for Corporate and Public Affairs, Sears, Roebuck and Company. Field Museum is particularly grateful to these persons and to the members of the Resource Planning and Development Committee for their efforts in recruiting exceptionally generous donors in all sectors: corporations, foundations, and individuals. The Museum wishes to cite these donors:

Benefactors elected during the biennium were: Amoco Foundation, Miss Virginia Billow (bequest), The Chicago Community Trust, Field Foundation of Illinois, Walter E. Heller Foundation, Mrs. Jean Butz James, The Joyce Foundation of Chicago, W. K. Kellogg Foundation, John D. and Catherine T. MacArthur Foundation, Robert R. McCormick Charitable Trust, and the Searle Family Trust.

Major Donors (Corporate, Foundation, and Individuals) were: The Allstate Foundation, Atlantic Richfield Foundation, Barker Welfare Foundation, Mr. and Mrs. Gordon Bent, Mrs. G. E. (Katharine) Boone, Borg-Warner Foundation, Mr. and Mrs. Roger O. Brown, Buchanan Family Foundation, Commonwealth Edison Co., The Consolidated Foods Corporation (now Sara Lee), Continental Bank Foundation, Mr. and Mrs. Robert O. Delaney, Mr. and Mrs. Gaylord Donnelley, Mrs. Marjorie H. Elting, FMC Foundation, Mr. and Mrs. Joseph N. Field, First National Bank of Chicago, Graham Foundation for Advanced Studies in the Fine Arts, Mrs. William A. Hark, Illinois Bell, Mr. and Mrs. Oscar G. Mayer, Mr. and Mrs. Kenneth Montgomery, McMaster Carr Supply Co., Sterling Morton Charitable Trust, Nalco Foundation, The Northern Trust Company, Frederick Henry Prince Charitable Trust, The Pritzker Foundation, Mrs. T. Clifford Rodman, Mr. and Mrs. Samuel R. Rosenthal, S & C Electric Co., Dr. Scholl Foundation, Mr. and Mrs. William L. Searle, Mrs. George T. Spensley, Mr. and Mrs. Jack Staehle, Mr. and Mrs. William Street, Mrs. Phelps Hoyt Swift, and Mr. and Mrs. Roderick S. Webster.

The Planned Giving Office, organized within the Development Office in 1981, continued to conduct an aggressive "will approach" in its program to interest members, donors, and friends in deferred giving. The program increased the popularity of making gifts through bequests, to perpetuate one's name and one's annual giving. In the biennium, $806,554 was received by way of bequests and added to the Museum's endowment funds. The Planned Giving Program has also sparked interest in deferred gifts (giving through life income annuity trusts), and, during the biennium, received three such gifts of future interest that totaled more than $400,000. Since its inception, a trustee committee of W.R. Dickinson, Jr., partner, Wilson & McIlvaine, and Hugo Melvoin, Hugo Melvoin, P.C., has given the Planned Giving Office capable leadership and wise guidance. All bequests and deferred gifts are placed in the Museum's endowment portfolio to ensure the Museum's future.□

David M. Wallstein

The dedicated service of Llois Stein, a Field Museum volunteer since 1972, was invaluable in the transformation and reorganization of Field Museum's Pacific Research Laboratory. Shown with her are carvings of human figures from New Guinea.

COLLECTIONS and RESEARCH: ANTHROPOLOGY

BENNET BRONSON, associate curator of Asian archaeology and ethnology, continued researching preindustrial iron metallurgy of Asian cultures; *History and Ethnology of Iron,* coauthored with Professor William Rostoker of the University of Illinois at Chicago, was in progress. Bronson spent two months in Thailand surveying archaeological sites and consulting with the Thai Archaeology Division and with officials of the Fine Arts University. Related research has resulted in published articles on the casting of farm tools and hardware in China, the cast iron bells of China, and archaeological radiocarbon dates from Indonesia.

Glen Cole, curator of prehistory and department chairman, continued work on the analysis of raw materials used at the Isimilia prehistoric site in Tanzania. Cole also studied Upper Paleolithic artifacts and associated faunal material from several sites in the Pyrenees area in southern France, acquired by former curator Henry Field in the late 1920s and early 1930s. Cole and collaborator Dr. Paul Bahn of Hull, England, a specialist in Pyrenean prehistory, worked toward publishing this material.

Alan L. Kolata, visiting assistant curator of Andean archaeology, did research for a monograph entitled *An Architectural History of Chan Chan.*

Phillip H. Lewis, curator of primitive art and Melanesian ethnology, compared the tourist art of the Sepik, the traditional art in the social context of New Ireland memorial ceremonials, and the National Museum of Papua New Guinea both as patron and as repository of art in a paper presented at the Pacific Arts Association's 3rd International Symposium on Oceanic Art. This research was based on field work done in New Ireland and on observations made in New Guinea in 1981.

Michael E. Moseley, curator of Middle and South American archaeology and ethnology, and Robert Feldman, visiting assistant curator of Andean archaeology, directed the continuing field research of Programa Contisuyu, a bi-national archeological project in the Moquegua Valley of southern Peru. Sites under study range from a shell midden near the coastal port of Ilo, radiocarbon dated at more than 10,500 years old, to sites around the city of Moquegua, ranging in age from Spanish Colonial (*ca.* AD 1650) to Tiwanaku (*ca.* AD 600-1000) and Pukara (*ca.* 300 BC). With the aid of students from the Universidad Catolica Santa Maria of Arequipa, Feldman directed excavation of a cemetery of the Chiribaya culture (*ca.* AD 1200) and a Tiwanaku house site, both threatened by urban expansion and construction. Moseley took a leave of absence starting September, 1984, to teach at the University of Florida, Gainesville.

John Terrell, curator of Oceanic archaeology and ethnology, completed his book *Prehistory in the Pacific Islands,* to be published by Cambridge University Press. He extended this line of research to give an unconventional picture of Australian prehistory, presented in a lecture delivered at the Quarternary Research Center at the University of Washington in May, 1984, entitled "Prehistoric Peoples of the Western Pacific." He also began work on an alternative biological model of the origin of Polynesian speakers and the evolution of human diversity in the Fijian archipelago.

James VanStone, curator of North American archaeology and ethnology, completed studies of two collections of ethnographic material, one collected by William Duncan Strong in 1928 from the David Inlet Barren Ground Naskapi in Labrador, the other collected at the end of the nineteenth century from the Oroki and Nivkhi of Sakhalin Island. Work continued on two other studies, one of contemporary Athapaskan Indian ethnographic objects from interior Alaska and another of Nunivak Eskimo material culture based on field notes of Dr. Margaret Lantis in the 1930s. VanStone also continued translating and editing the journals of nineteenth-century Russian explorers in southwest Alaska.

A major advance in the storage of anthropological materials was achieved with the reorganization and renovation of the Pacific Research Laboratory, a facility with some 35,000 objects from Australia, Melanesia, Polynesia, Micronesia, Indonesia/Malaysia, and Madagascar.

The project, initiated in 1981, was made possible by a $168,800 grant from the National Science Foundation. Codirectors of the project were Phillip Lewis and Phyllis Rabineau, custodian of collections. Staff members who worked on the project were Kathleen Christon, Christine Taterka Gross, E.B. O'Malley, Beth Koenen-Seelbach, Maryanne Schoch, and Col. Millard Rada. Volunteer Llois Stein also contributed invaluably to the project.

Before reorganization, the Pacific Research Lab was equipped with 10,525 sq. ft. of shelving, an insufficient amount to properly accommodate the collection. During the grant-funded reorganization project, shelf area was increased by almost 70 percent. Three thousand sq. ft. of new shelving were purchased, and this was supplemented with 4,000 sq. ft. of used shelving already on hand. Lighting throughout the storage area was improved by adding new fluorescent fixtures and installing ultraviolet filters. All objects in the PRL were cleaned and their storage arrangement was shifted to a rational arrangement based on provenience data.

In addition to the tasks funded by the NSF grant, several other improvements were carried out with museum resources: Interior walls of the storage area were painted; the concrete floor was sealed; the work area just outside the storage area of PRL was redesigned to be used for processing accessions and loans, and as research space; the climate control system in PRL was retrofitted to ensure an absolutely stable temperature and humidity (70°F and 50% RH). The techniques used to stabilize climate control in PRL will be used to help redesign other heating and airconditioning systems in the building. □

David M. Walsten

Plants of the World Hall, viewed from the lounge.

COLLECTIONS and RESEARCH: BOTANY

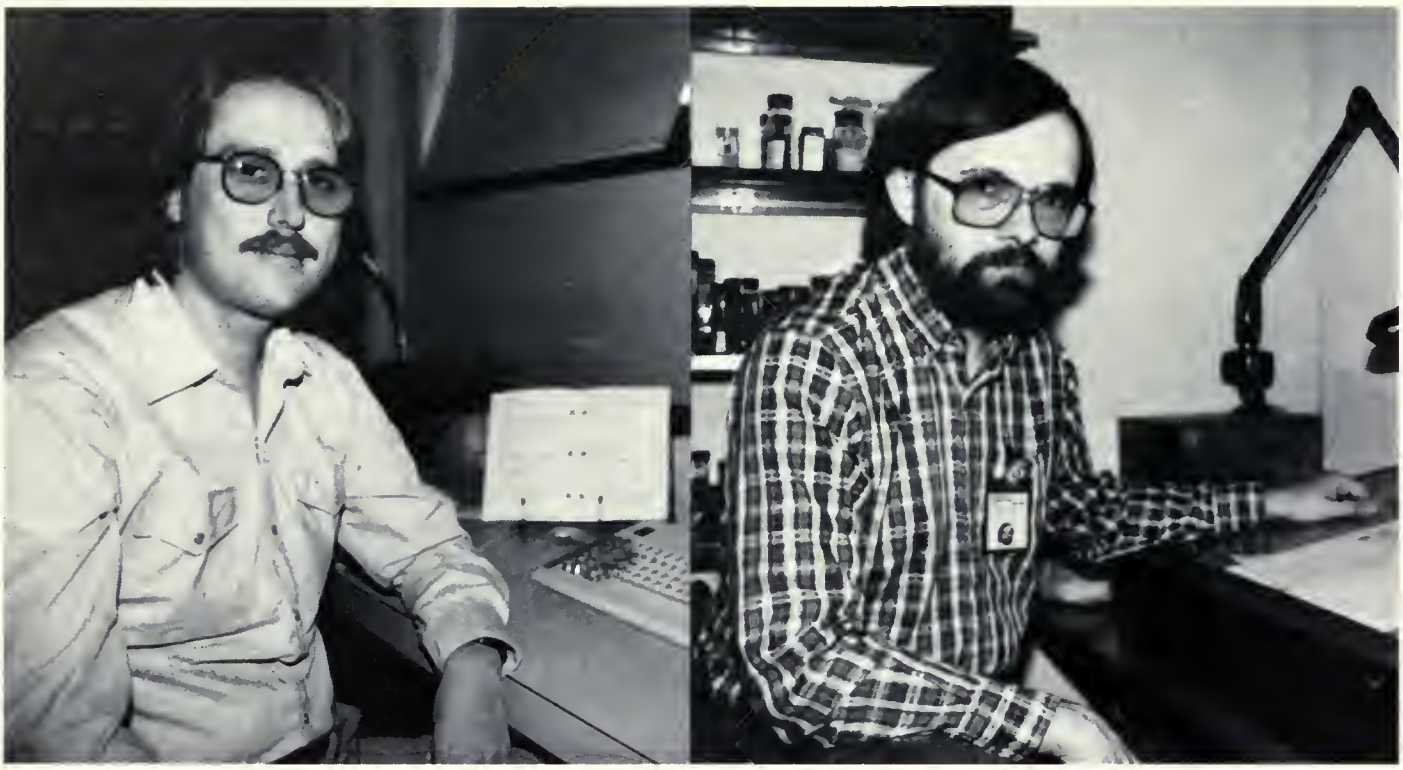
The work of the Department of Botany falls into several categories. The research activities of 1983-84 are best expressed by the published research of staff members (see page 31). The five staff curators in Botany covered a wide range of research interests. William Burger continued his work on the Flora of Costa Rica project with a study of the Lauraceae family. This family includes the avocado and sassafras and many important tropical timber trees, but is also marked by a very poorly developed system of classification. Michael Dillon continued his work in the sunflower family (Compositae), especially those in Peru, where more than 1,400 species are found. He also began a major study of the *lomas* formations, unusual "islands of vegetation" within the deserts of Peru's arid Pacific coast. John Engel continued his work on liverworts (Hepaticae) of the southern end of the world, especially Tasmania and New Zealand. He continued his revision of several large and difficult groups well represented in this area as part of this project. Timothy Plowman's interest focused on the origin, history, and ethnobotany of the coca plant, as well as the taxonomy of the coca family (Erythroxylaceae). Another important research interest was the ethnobotany of the upper Amazon Basin, and Dr. Plowman worked together with several anthropologists to produce documented treatments of how plants are used in this area. Patricio Ponce de León continued his studies in the puffball and earth stars fungi (Gastermycetes) and aided physicians in the identification of mushrooms in cases of suspected poisoning.

Botany was fortunate in having a number of visiting assistant curators working in the department during the 1983-84 biennium. Kerry Barringer worked on the Flora of Costa Rica program; he prepared a treatment of the snapdragon family (Scrophulariaceae) and, with a colleague, a listing of Costa Rica's 1,130 species of orchids. Sylvia Feuer-Forster worked on her own pollen-study research in the mistletoes (Loranthaceae) and related families. Michael Huft participated in the Flora Mesoamericana project of the Missouri Botanical Garden, but he was stationed at Field Museum because of its very strong holdings from Central America. Michael Nee worked with the Flora of Veracruz, Mexico, program and collected intensively in the area of the flora.

Closely related to research as well as to the Museum's collecting programs are the expeditions and field work. These usually are planned well in advance and are part of long-term projects. However, with the unusual *El Niño* weather perturbation of 1982-83, the coastal deserts of Peru burst into full flower and Michael Dillon initiated a series of three collecting trips (see "The Silver Lining of a Very Dark Cloud," by Dillon in the March 1985 *Field Museum of Natural History Bulletin*). Timothy Plowman participated in two important expeditions: the western Amazon of Brazil and to the Cerro de la Neblina in southernmost Venezuela. In addition, he visited several other areas of Brazil to gather rarely collected species. John Engel spent five months collecting and working with colleagues in New Zealand's South Island and in Tasmania. Our visiting curators did field work in Veracruz and Chiapas, Mexico, and in Costa Rica during 1983 and 1984.

A major category of work in Botany deals with the collections themselves and our loan program. We sent 53,166 specimens out on loan for study during 1983 and 1984. This loan program makes our material available to scholars all over the world. In this same period we took in about 42,000 specimens through expeditions, exchanges, gifts and purchases. Many of the new collections were not identified and require the efforts of our staff or outside specialists to identify. This work, together with providing loans, mounting of speciments, and maintenance of collections, required the full-time effort of more than six staff members. Care of our 2.2 million plant specimens and the addition of high-quality new material were central responsibilities for the Museum's botanists.

In September 1983 the Museum reopened its largest botanical exhibit, "Plants of the World." Used as a staging area for the "King Tut" exhibit of 1977 and having suffered minor damage during the building renovation, the hall was in need of a major face-lifting. Generous contributions from the Field Foundation of Illinois and the Women's Board made possible a reorganization of the hall and the reinstallation of nearly all the exhibits. Warm incandescent lights were provided to highlight the plant models against a natural wood background. Color photographs, diagrams, and a uniform format of easily read explanatory labels complement the life-like models. These models, more than 400 in number, were built in the Museum's plant reproduction laboratory (no longer in operation) over a period of sixty years and are notable for their natural appearance. The collection includes many tropical and economically important plants, providing a richly aesthetic experience as well as fulfilling an important educational role. □



David M. Walsten

David M. Walsten

Scott Lidgard (left) and Lance Grande were Field Museum's new curators in 1983-84. Lidgard, who joined the Geology staff as assistant curator of Fossil Invertebrates in October 1984, is investigating evolutionary patterns of growth and form in fossil animal colonies. Grande, who arrived in October 1983, is particularly interested in the relationships and comparative osteology of fossil teleost fishes. As assistant curator of Fossil Fishes, he oversees one of the world's finest collections of such material.

COLLECTIONS and RESEARCH: GEOLOGY

THE DEPARTMENT OF GEOLOGY appointed two new staff members during the 1983-84 biennium. Published research addressed a broad spectrum of geological problems (see page 32) in the fields of paleontology, petrology, and meteoritics. Growth of the departmental collections continued in all areas but was especially strong in fossil fishes, mineralogy, and fossil plants. In the sphere of public programs, Edward Olsen was heavily involved in the planning and design of the new Gem Hall.

Invertebrate Paleontology and Paleobotany. Scott Lidgard joined the staff from Johns Hopkins University in October 1984, as assistant curator, Fossil Invertebrates. He initiated several projects on the fossil history of changing patterns of growth and form in animal colonies. Matthew Nitecki continued his research on the evolution, morphology, and systematics of Lower Paleozoic problematic fossils and algae. He was co-organizer of the Third International Congress on Fossil Algae, and in conjunction with his research he spent six months during 1984 as an exchange scholar in the USSR, supported by the U.S. and Soviet Academies of Sciences. With the support of the National Science Foundation, Nitecki also continued to organize the Field Museum Spring Systematics Symposia, which dealt with the topics of *Extinctions* and *The Evolution of Behavior* during 1984 and 1985. Peter Crane completed studies of fossil plants from southern England and western North America that provided the first detailed information on several widespread and ecologically important early Tertiary species. He also continued his work (with D. L. Dilcher) on the morphology, systematics, and biology of some of the most ancient angiosperm flowers currently known. In May 1984 Crane was awarded the Bicentenary Medal of the Linnean Society of London in recognition of his paleobotanical work.

Vertebrate Paleontology. John Bolt continued his research on Upper Paleozoic and Triassic reptiles and amphibians, with field work in Arizona, New Mexico, and Oklahoma. Studies of the origin of frogs, and patterns of jaw growth and tooth replacement in fossil amphibians and reptiles were completed, and new projects on larval amphibians from the Pennsylvanian "Mazon Creek" fauna were initiated. Lance Grande joined the staff in October 1983 from the American Museum of Natural History as assistant curator, Fossil Fishes. His research interests focus on the systematics and biogeography of Mesozoic to Recent fossil fishes, particularly the relationships and comparative osteology of fossil and Recent herring and herring-like fishes. Grande's 1984 field season in the Green River Formation of Wyoming substantially enhanced the fossil fish collections at Field Museum with numerous spectacular specimens. William Turnbull carried out field work on Eocene mammalian faunas in the Washakie Basin of Wyoming. He is currently studying the rodent *Protoptychus* and (with Research Associate Kubet Luchterhand) the primates from the Washakie fauna. Turnbull also continued his research on the functional morphology of the mammalian masticatory apparatus and ear region. During 1984 he visited the Museum of Victoria (Australia) to complete several aspects of his work (with Research Associate Ernest Lundelius, Jr., University of Texas, Austin) on Tertiary and Pleistocene-Holocene fossil faunas in Australia.

Meteoritics, Mineralogy and Petrology. Edward Olsen continued his research in various aspects of meteoritics, and with George McGhee of Rutgers University completed an initial study aimed at testing the hypothesis of asteroid impact in the Late Devonian. Collaborative research continued with colleagues at Argonne National Laboratory and the University of Chicago, and several projects were completed dealing particularly with carbonaceous and ordinary chondrites. Bertram Woodland continued studies on the origin of rock cleavage and mineral fabric development in very low-grade metamorphic rocks, and completed work on the growth and shape modifications of chlorite porphyroblasts relating to cleavage in mudstone and concretions. These studies have now been extended to include biotite and chlorite porphyroblasts in slates from upper Michigan. □

The outstanding work of Peter Crane, assistant curator of Paleobotany, was widely recognized. He received in 1984 the British Paleontological Association's annual award for the best paper given by a research worker under the age of 30. Later he received the Bicentenary Medal of the Linnean Society of London—an annual award to an outstanding biologist under the age of 40. In 1983 he was named co-editor of the distinguished journal Paleobiology. *Crane joined the Field Museum staff in 1982.*

David M. Walsten

David M. Welsten

Field Museum has a long tradition of hosting visiting scientists who wish to draw upon the Museum's vast collection resources and research facilities. Mr. Yang Datong (left), curator of Herpetology at Kunming Institute of Zoology, the People's Republic of China, spent several months studying the taxonomy of the frog genus Amolops. *Jack Fooden (right), a research associate in Zoology since 1969 and professor emeritus of Zoology at Chicago State University, continues his work at Field Museum on the evolution and biology of the Asian monkey genus* Macaca *(macaques), on which he is a world authority.*

COLLECTIONS and RESEARCH: ZOOLOGY

THE DEPARTMENT OF ZOOLOGY, the largest of the Museum's four curatorial departments, consists of six divisions: Amphibians and Reptiles, Birds, Fishes, Insects, Invertebrates, and Mammals, staffed by twelve curators, six collection managers, and support personnel in various technical and nontechnical positions. The range of their research activities was reflected in the publication of more than 60 papers and monographs during the 1983-84 biennium (see pp. 33-35).

Amphibians and Reptiles. Harold Voris studied sea snake populations in Malaya. He also studied aspects of the biology of sea snakes and developed procedures for marking the live snakes, thus solving a major problem in ecological studies of this group. With Research Associate William Jeffries and Mrs. Yang Chang Man, Voris also worked on the growth and life history of two barnacle species that occur symbiotically with the crab *Scylla serrata*. Robert F. Inger continued an ecological analysis of frogs of southern India. He also completed a key to the frogs of Sarawak and studies on paternal care in a Sarawak frog species. Hymen Marx completed (with Research Associate Eric Lombard) studies of a highly variable skull bone in the feeding apparatus of snakes. Alan Resetar worked on revision of two genera of African snakes. Research Associate Sharon Emerson did research on the biomechanics and development of frog pectoral girdle morphology—work supported by a National Science Foundation grant.

Birds. John Fitzpatrick completed a checklist of birds and mammals of Cocha Cashu Biological Station, Manu National Park, Peru. The list is the most complete inventory of these fauna for an Amazonian locality ever published. Fitzpatrick continued (with Research Associate G. E. Woolfenden of the University of South Florida) life history and demography studies of the Florida scrub jay. Their book, *The Florida Scrub Jay*, was published late in 1984. Fitzpatrick also completed (with Jurgen Haffer of West Germany) analysis of geographic variation of certain Amazonian bird species. This was the first use of computer-generated "trend surface" maps to illustrate regional patterns of variation across the Amazon basin. David Willard continued to study mensural characteristics of spring versus winter migrants salvaged from the Chicago area. With J. Fitzpatrick he also studied winter distribution of birds in the western Great Lakes region. Willard and Research Associate Joel Cracraft contributed to a survey of Venezuela's Cerro de la Neblina. This highly publicized project is producing the first thorough scientific collection from this isolated massif.

Fishes. Robert Johnson continued studies on the shore fishes of Belize and Honduras in Central America. He organized two collecting expeditions to Isla Roatan off the north coast of Honduras. In 10 years of collecting in Belize and Honduras he and colleagues have amassed the largest and most diverse (by habitat and by species) collection of Caribbean fishes from Central America. Johnson was an invited speaker and contributed 3 papers in the international symposium, "Ontogeny and the Systematics of Fishes," held in La Jolla, California. He was elected and is serving as managing editor of *Copeia*, the scientific journal of the American Society of Ichthyologists and Herpetologists. The work of Donald J. Stewart focused on neotropical freshwater fishes. His 1983 collecting expedition to Amazonian Ecuador yielded (together with materials from a similar expedition in 1981) the single most comprehensive set of fish samples ever taken in the Upper Amazon, covering nearly all available habitats between altitudes of 200 and 2,500 meters.

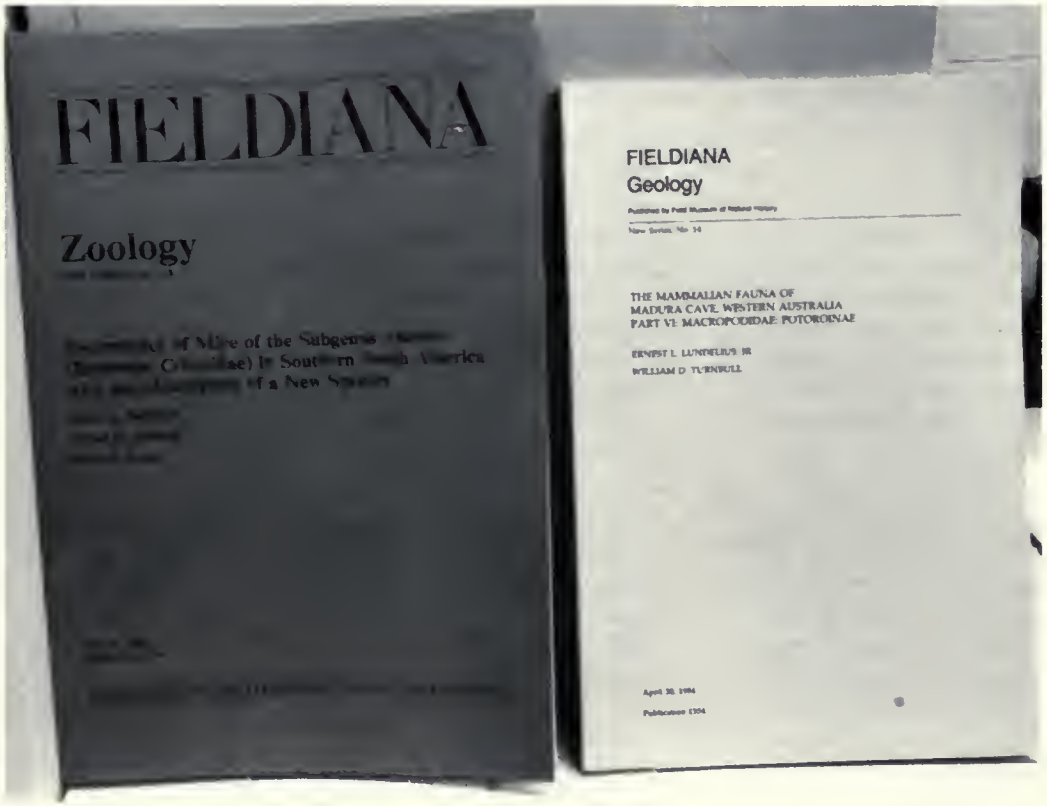
Insects. Research focused on the systematics and evolution of staphylinid beetles and of soil and parasitic mites. John J. Kethley completed a study of relationships among harpypalpine mites, which are parasitic on birds. Larry Watrous continued study of the systematics and evolution of certain staphylinid beetles and worked with James S. Ashe on studies of descriptive features of immature staphylinids. Ashe continued work on mushroom-inhabiting staphylinids, including studies of the evolutionary relationships between structure and food-plant preference in these beetles.

Invertebrates. Alan Solem completed 20 years of research with publication of a 336 quarto-page monograph, *Endodontoid Land Snails from Pacific Islands. Part II. Families Punctidae and Charopidae, Zoogeography*, which includes descriptions of 19 new genera and 50 new species; carried out extensive fieldwork in central and northwestern Australia, collecting about 20,000 specimens of land snails; published 500 pages of technical reports on Australian camaenid land snails; organized and chaired in September 1983 a three-day symposium in Budapest, Hungary that resulted in a 191-page volume, *World-wide Snails: Biogeographical Studies on Non-marine Mollusca*, published by E. J. Brill, Leiden, in late 1984.

Mammals. Bruce Patterson, whose work focuses on morphological and genetic variation in mammals, conducted detailed studies of mammal populations along altitudinal transects of rain forest habitats in Chile and surveyed the fauna on six islands in the Chilean Archipelago. This work resulted in the discovery of a new mammal species and a valuable data base for additional studies. Robert Timm, whose work focuses on the ecology and systematics of Neotropical bats and on host-parasite coevolution, made a mammal survey in Amazonian Ecuador. This work included studies of tent-making bats, and a survey and report on the endangered Amazonian manatee.

David M. Walsten

Zbigniew T. Jastrzebski, senior scientific illustrator, Scientific Support Services, was the senior member of a team of four artists who provided a wide variety of illustrations for the scientific departments.



David M. Walsten

Fieldiana, *Field Museum's research journal published since 1895, underwent a change of format in 1984. The new format* left, *and the old format* right.

SCIENTIFIC SUPPORT SERVICES, FIELDIANA

THE DEPARTMENT OF SCIENTIFIC SUPPORT SERVICES (formerly the Advanced Technology Laboratories) had a busy biennium. Rechristened in recognition of the expanded services it provides, the department was responsible for the scientific computer, the scanning electron microscope, and scientific illustration, as well as the histological and biochemical laboratories. Major initiatives during the last two years included: full-fledged collection computerization efforts by several scientific departments; development of short-term and long-term plans for future computerization; expanded laboratory facilities for the scanning electron microscope; continued production of highest-quality scientific illustrations for publications by the Museum's curatorial staff; acquisition of photostat copier and label generator, enlarging the scope of illustration services; refurbishment of the histological laboratory; coordination of long-term plans for the biochemical labs. The range and quality of these essential services are reflected in the quality and number of scientific articles published by the Museum's scientific staff (pp. 30-35). □

Fieldiana, Field Museum's research journal, underwent a change in format in July, 1984, increasing in page size from 6 x 9 inches to 7 x 10 inches, and changing in page design from one column to two. Of the 18 titles published during the biennium (Anthropology 1, Botany 5, Geology 2, Zoology 10), three appeared in the new format. Timothy C. Plowman, associate curator of Botany and former chairman of the Publications Committee, succeeded John R. Bolt as scientific editor. James W. VanStone, curator of North American archaeology and ethnology, was named assistant scientific editor.

David M. Walsten

Tanisse R. Bezin, managing editor of Fieldiana.

Diane Alexander White

A school teacher and students enjoy exhibit-viewing in field trip portion of the program "Student/Teacher Internship in a Cultural Institution," or STICI. STICI *is the Education Department's program of workshops and field trips designed to train Chicago teachers in the special object-based skills needed to teach effectively in museums. The two-year program was funded by the Joyce Foundation.*

EDUCATION

THE PROGRAMS OFFERED by the Department of Education are as diverse as the many publics that are served. Field Museum provides a unique learning environment with its rich resource of real objects. The visitor may contemplate the meanings of these treasures at leisure or actively participate in a program or series of programs that builds on a special interest and/or personal experience. Museum "education" is interpretive and interactive. It is designed to lead the visitor to explore and discover the mysteries of the earth and its inhabitants at specific points in time together with the implications for the future.

During 1983-84, the Museum hosted 9,041 school classes with 400,000 students and their teachers. Of these, 6,582 classes received special programs designed to augment their classroom studies. In addition, 3,246 teachers borrowed over 8,500 items from the department's free loan center, Harris Extension. Over 4,500 adult learners enrolled in 207 multi-session courses, and 4,222 visited 117 ecologically important sites during Kroc field trips. Over 244,000 parents and children shared the delight of touching and exploring shells, meteorites, birds, and beaver among many other objects in the *Place for Wonder,* and 104,000 experienced what life was like in the 1850s in the *Pawnee Earth Lodge*. Each weekend, visitors received a "Passport to Discovery," listing the events for the day, when they entered the Museum. Free programs included the China Festival, Najwa Dance performance, paper-making, Japanese Tea Ceremony, Dinosaur Days, Caribbean Connection, Gospel Choir, and the Darlene Blackburn Dancers. Theatre programs included Peking Opera, Ravi Shankar, Yueh Lung Shadow Theatre, John Paling lecturer, and the Anthropology Film Festivals. Summer and Winter Fun—two-hour workshops—attracted over 3,700 children, who participated in everything from making masks or clay pots, and bug-hunting to spending a night in the Field.

In total, 11,516 programs were presented to 759,725 individuals. Much of this would not have been possible without our 150 volunteers who assist and teach with the staff. Another 150 volunteers work in the scientific collections, public relations, development, and so forth. Together, this volunteer support equalled 77,821 hours, or 42.75 man-years of work. In financial terms, this contribution was over $500,000. But even more important—volunteers bring a fresh perspective and the public's viewpoint to our work, and their enthusiasm bolsters our spirit.

Outside support for the education program continued from other sources: a two-year extension by the Joyce Foundation for Student Teacher Internships 1984-1986; the national program "Museums: Agents for Public Education," W. K. Kellogg Foundation; "Science in Action," University of Illinois—Chicago and the Spensley Fund; "Museology for Gifted High School Students," Chicago Board of Education; "Ethnic and Folk Art Museum Survey," Illinois Arts Council; "African Insights: Sources for Afro-American Art and Culture," Illinois Humanities Council; interpretive programs "Treasures from the Shanghai Museum," National Endowment of the Humanities; interpretive programs "Black Folk Art in America 1930-1980," National Endowment for the Humanities and the Teacher Preview "Black Folk Art," Atlantic Richfield. □

Steven E. Gross

Renowned composer-musician Ravi Shankar performed to capacity audiences on November 16 and 17, 1984, in James Simpson Theatre. The Shankar performances were among many by leading singers, dancers, puppeteers, musicians, and opera groups offered by the Education Department during the biennium.

Diana Alexander White and Ron Testa, 83633

EXHIBITION

THE HALLS OF FIELD MUSEUM provided venue for eight temporary, traveling exhibits in 1983-84. "Master Dyers to the World: Early Fabrics from India," made available by the Textile Museum of Washington, opened to the public on January 29 and closed on April 10, 1983. Selected from museums and private collections around the world, the exhibit consisted of more than 100 textile items produced in India between the fifteenth and nineteenth centuries, illustrating India's supremacy in the dyer's art.

The Scientific Illustration Exhibit, on view from February 14 to April 15 and again from July 15 to December 15 of 1983, was produced by the Field Museum staff. It utilized scientific illustrations (mostly by Field Museum staff illustrators, past and present) to explain the history, techniques, and rationale of this special discipline. Approximately 40 illustrations in a variety of sizes and rendered in a number of media were displayed. Photographs as well as actual specimens used as subjects were also shown. The show was mounted on individual frames and designed to "rotate" in exhibit areas at times when those spaces were to be otherwise vacant.

"Louis Agassiz Fuertes: A Retrospective," organized by the Academy of Natural Sciences, Philadelphia, was on view April 30 through June 26, 1983. It was the first comprehensive display of works of this American artist, who lived from 1874 to 1927. The exhibit examined Fuertes' historical and stylistic antecedents, traced the particular artistic influences shaping his destinctive style, and analyzed the development of his technical mastery.

"The Vanishing Race and Other Illusions: A new Look at the Work of Edward Curtis," was on view from May 21 through July 21, 1983. One hundred twenty original prints from Smithsonian and Library of Congress collections provided insight into photography as documentation vs. photography as art. Many of these previously unpublished photos gave "before" and "after" views of the same image, showing the effects of darkroom manipulation caused by Curtis' attempts to remove evidence of white influence on the Indians from his photos. The exhibit also included about 20 pieces of equipment of the type used by Curtis.

"Treasures from the Shanghai Museum: 6,000 Years of Chinese Art," organized by the Shanghai Museum of the People's Republic of China and by the Asian Art Museum of San Francisco, was on public view November 5, 1983, through February 14, 1984. This unique exhibition of 232 objects was selected entirely from the collection of Shanghai's major museum. Spanning the period from Chinese prehistory through the twentieth century, the exhibit reflected the varying techniques and styles of Chinese artists in a multitude of forms: sculpture, painting, ceramics, bronzes, and jades.

"Eskimo Art and Culture," on view from March 10 through May 27, 1984, consisted of two separate shows: "Inua: Spirit World of the Bering Sea Eskimo" and "Grasp Tight the Old Ways: The Klamer Family Collection of Inuit Art." The former was circulated by Smithsonian Institution Traveling Exhibition Service (SITES), the latter by the Art Gallery of Ontario. The SITES exhibit was drawn from the extensive, never-before-exhibited Edward W. Nelson collection at the National Museum of Natural History. "Grasp Tight the Old Ways"—about 175 pieces—consisted mostly of works by contemporary artists.

"Black Folk Art in America 1930-1980," on view April 14 through July 15, 1984, was circulated by the Corcoran Gallery of Art and consisted of works by twenty sculptors, painters, and other graphic artists. Partly concurrent with that show was "African Insights: Sources for Afro-American Art and Culture," on view April 29 through December 31, and drawn largely from Field Museum's own collection. Guest curator for the exhibit was Richard J. Powell, who provided accompanying lectures. Mr. Powell also wrote the text *African and Afro-American Art: Call and Response*, to accompany the exhibit.

A major achievement of the Exhibition Department was the modernization of the Museum's signage system and its installation in 1984—a radical improvement over the previous system of signs for guiding visitors about the building. The system included directory maps, a handout map, elevator directories, and temporary signs. All components were designed to be easily modified or changed, according to the dictates of future needs.

The major permanent installation during the biennium was "Plants of the World," in what had formerly been designated Hall 29. The exhibit presents more than 600 species of plants, fossil as well as living. (For more on this installation see page 13.)

To improve the effectiveness of exhibit planning, the Controls Division of the Exhibition Department computerized the department's financial operation. As a result, it was able to more accurately and rapidly develop exhibit budgets, monitor and control exhibit costs, and produce weekly or—on demand—project reports designed to fit special needs, on the financial status of any project or of the department as a whole. The ability to easily establish encumbered costs as incurred, made it possible to better anticipate deviations from the budget and to take corrective action. It also permitted the development of special cost analyses tailored to the department's needs. With the inception of a projected ten-year plan, this would enhance planning efficiency and make possible the maximum output for expenditures. □

Opposite: *Display of polychrome pottery figurines from the Ming dynasty (A.D. 1368-1644). These, together with 200 other art objects and artifacts were on view November 5, 1983, to February 14, 1984, comprising the exhibition "Treasures from the Shanghai Museum—6,000 Years of Chinese Art." The exhibit was organized by the Shanghai Museum of the People's Republic of China and the Asian Art Museum of San Francisco. Principal funding was by Control Data Corp., Sargent & Lundy, and Consolidated Foods Corp.*

(Above left) *Original pencil and ink and* (below right) *watercolor renderings by Christophe Paulin de Freminville; from a collection of 28 original drawings, the gift of Albert G. Lowenthal.* (Above right) *One of 35 engraved plates from Michael Besler's* Gazophylacium Rerum Naturalium *(Leipzig, 1642), depicting objects in the author's natural history "cabinet"; and* (left) *Polydore Roux,* Ornithologie Provencale *(Paris, 1825-1830), with 450 hand-colored plates of the birds of southern France. Both the Besler and the Roux were the gifts of Mr. and Mrs. John Runnells.*

Photos by David M. Wallstein

THE LIBRARY

IN 1983-84, THE LIBRARY entered a period of self-evaluation, which has already resulted in improved processing routines and in more effective services to Museum staff and public patrons. Over 5,500 monographic volumes and as many volumes of journals were added to the Library collections through a variety of means, including the international publications exchange program, the U.S. Depository System, gifts and purchases. As in former years, regular acquisition funds were supplemented through endowed acquisition funds given by Louis A. and Frances B. Wagner, Mr. and Mrs. Walter Cherry, and Mrs. Chester Tripp. These funds have continued to strengthen the Library resources that are indispensable to the Museum's scientific research programs. With the end of the biennium, the volumes held in the general, departmental and divisional Libraries totaled 215,000.

The Library extends its services to the public as a noncirculating research collection, and during this period more than 2,000 visitors to the public Reading Room made use of over 12,000 volumes. The Library's highly specialized collections continued to be made available to the wider scholarly community through the Interlibrary Loan system, with over 1,400 loans of Library materials made to libraries throughout North America for use by their patrons. The majority of these loans were initiated through OCLC (Online Computer Library Center), a computerized bibliographic service center with 5,000 member libraries nationwide. A member of OCLC since 1977, the Library has acquired a second OCLC terminal which operates both online and offline as a standalone computer. This tool has greatly improved many aspects of library processing and has enabled staff to collect and analyze large amounts of data, contributing to more effective planning and improved services to Museum staff.

Among the many gifts received, mention should be made of a collection of chiefly botanical works donated by Mrs. Robert Van Tress of Chicago, and of a copy of William Nelson's limited edition portfolio of color lithographs, *The Sun Dance*, depicting the traditional Sioux ceremonial, donated by Connie G. Westenfelder of Glenview, Illinois.

This has been a very active period in the Mary W. Runnells Rare Book Room. Through the continuing support of Trustee and Mrs. John Runnells, several important works have been added to the Rare Book Collections. Of special note are three illustrated bird books that Edward E. Ayer, Field Museum's first president, was unable to acquire in the course of building his magnificent ornithological library: Captain Thomas Brown's *Illustrations of the Genera of Birds* (London, 1845-46); B. L. Du Bus de Gisignies, *Esquisses Ornithologiques* (Brussels, 1845-48); and Polydore Roux, *Ornithologie Provençale* (Paris, 1825-30).

Another acquisition was the rare and beautiful *Gazophylacium Rerum Naturalium* of Michael Besler, printed in Leipzig in 1642. Bound in gold-stamped vellum, this work consists of 35 exquisitely engraved illustrations of objects held in Besler's private natural history collection. This copy, printed on unusual fine blue paper, with remarkably fresh and clear impressions from the engraved plates, may well be a proof copy or at the very least one of the first copies to be printed from the plates (see illustration). In recognition of the importance of the Rare Book Collections, the Runnells have also supported the restoration program for these materials. Two significant works have been completely restored: Pierre Belon, L'*Histoire de la Nature des Oyseaux* (Paris, 1555), the first illustrated ornithological treatise; and Rosel von Rosenhof, *Historia Naturalis Ranarum Nostratium* (Nurnberg, 1758), containing richly hand-colored illustrations of the anatomy and life cycles of frogs.

Another important addition to the Rare Book Room was a collection of 28 unpublished original zoological drawings and watercolors by Christophe Paulin de Freminville, an early nineteenth-century French naturalist. Freminville's drawings blend precise detail with artistic subtlety and, had they been published, would have brought him renown as one of the finest natural history illustrators of his time. Apparently lost during his lifetime, his works were only recently rediscovered. Purchase of this collection of Freminville originals was made possible by a generous donation from Mr. Albert G. Lowenthal of New York. □

David M Walsten

David M Walsten

William Grimé, manager of the Systematic Botanical Collection, with the intriguing, instructive display he created as a Members' Night exhibit—"Legends of Luxury: Botanical Cosmetics" (detail below). In the uniqueness of the learning experience offered, Grimé's remarkable exhibit was typical of many created for the annual occasion by Museum staff.

THE WOMEN'S BOARD, TOURS, MEMBERSHIP

FOUNDED IN 1966 by the late Ellen Thorne (Mrs. Hermon Dunlap) Smith, the Women's Board continues its tradition of leadership, support, and involvement at Field Museum. At the close of 1984, three Women's Board members were serving on the Board of Trustees, fifteen on committees of that group, and many more as volunteers in various Museum departments. Susan Vanden-Bosch served as Women's Board coordinator.

Mrs. T. Stanton Armour, a dedicated and inspired president, completed her term of office at the 1984 Women's Board annual meeting and was ably succeeded by Mrs. Philip D. Block III, who continues to bring creative and dynamic leadership to the office.

The Women's Board sponsored a number of major programs during these two years. In March 1983, Mrs. Byron C. Karzas and Mrs. Edward F. Swift were co-chairmen of the Botany Ball and Botany Day—a formal dinner dance and a day of special botanic lectures—to raise funds for the renovation of the magnificent permanent exhibit, "Plants of the World." These activities and other Women's Board fund-raising projects enabled the Board to successfully meet its goal of $300,000 in support of the renovation of the Hall to match a contribution from the Field Foundation of Illinois, in memory of its former chairman, the late Hermon Dunlap Smith. In September 1983, Museum trustees, staff, and special guests joined the Women's Board in welcoming members of the Smith family in celebration of the opening of the newly renovated hall.

In November 1983, Women's Board member Mrs. Malcolm N. Smith served as chairman of a gala preview dinner to recognize the opening of the travelling exhibit "Treasures from the Shanghai Museum: 6,000 Years of Chinese Art." Over 600 guests attended the preview event.

In December 1983 and 1984, the Women's Board sponsored the popular annual holiday gathering, "A Family Christmas Tea at Field Museum." Festive decor, special entertainment and activities, and music of the holiday season combined for an enjoyable family outing. □

FIELD MUSEUM TOURS, under the direction of Dorothy S. Roder, offered itineraries involving each of the Museum's four scientific disciplines during 1983-84. These natural history tours went both years to Egypt, the People's Republic of China, Kenya, and to the Grand Canyon. In addition, tours were offered to Alaska, Baja California, southern England, Peru and Bolivia, New Providence and Andros Islands, to the Lesser Antilles aboard the sailing ship "Sea Cloud," and to the Isla Roatan for a tropical marine biology exploration. Baraboo, Wisconsin was featured as a weekend trip, and in 1984 our first tour for Founders' Council members was offered—a trip to northern Michigan. All tours were led by scientists, most of them curators in the Field Museum departments of Anthropology, Botany, Geology, and Zoology. □

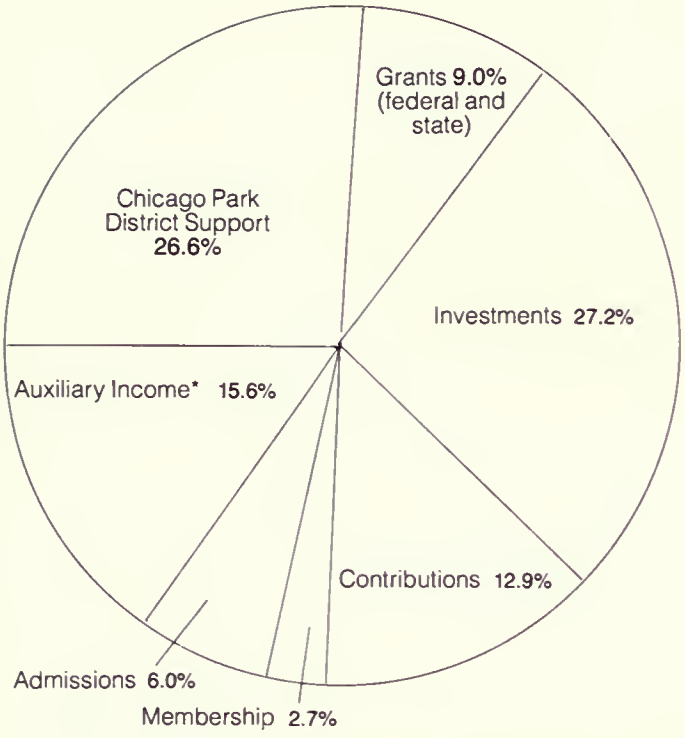
DURING THE 1983-84 BIENNIUM, the Membership Department encouraged Members to actively participate in exhibit previews and in the annual Members' Night. The reinstallation of the South Information booth, staffed by Membership representatives, encouraged current and prospective Members to take part in the "Treasures of the Shanghai Museum" Members' preview, on November 4, 1983. The event drew 3,593 viewers.

March 9, 1984, was the date of the "Inua: Eskimo Art and Culture" Members' preview. The 1,500 participating Members and guests took part in igloo-building, mask-making, and telling tall tales at the Northwest Coast totem poles.

Members' Night for 1984, coordinated by the Membership Department, fell on October 12. For five hours, more than 5,000 visitors enjoyed special exhibits, activities, and entertainment throughout the Museum, with access to the research and preparation areas that are customarily not accessible to visitors. □

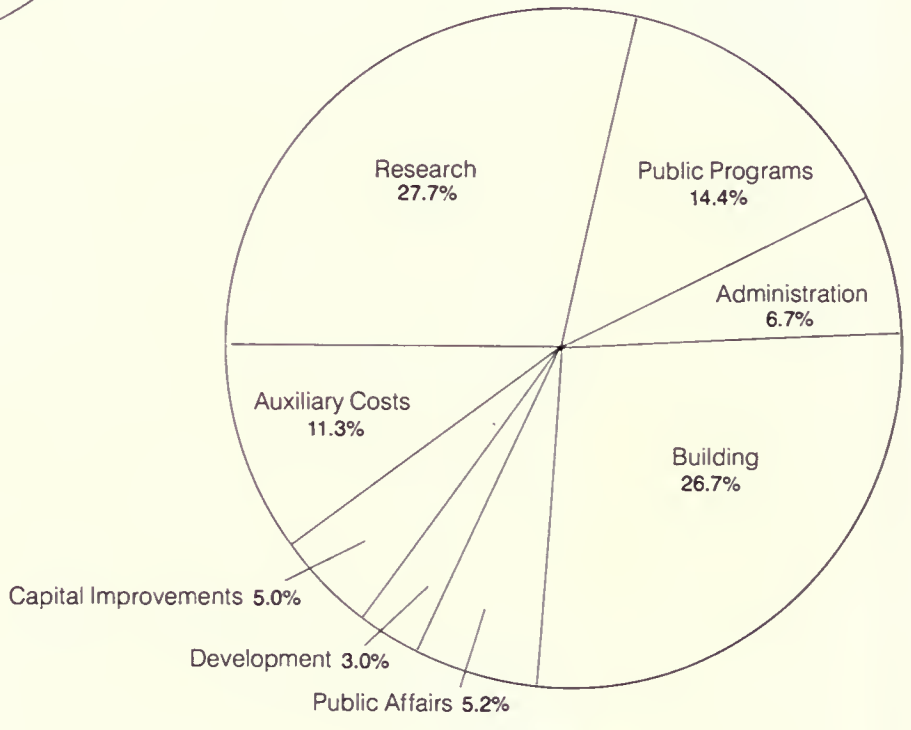
FIELD MUSEUM OF NATURAL HISTORY

Financial Activity
For the year ended December 31, 1984



*Museum Store, food service, special events

Revenues



Expenses

FIELD MUSEUM OF NATURAL HISTORY

Balance Sheet

December 31, 1984

	Unrestricted Funds	Board Designated Restricted Funds	Endowment Funds	1984 Combined Total	1983 Combined Total
Assets					
Cash	$ 588,304	$ –	$ –	$ 588,304	$ 446,841
Marketable Securities	9,453,251	–	–	9,453,251	7,332,842
Accounts Receivable	378,209	333,899	–	712,108	930,620
Museum Store Inventory	479,442	–	–	479,442	402,215
Prepaid Expenses	10,840	–	–	10,840	19,255
Deferred Charges	40,436	–	–	40,436	55,644
Investments	–	–	42,181,448	42,181,448	45,593,700
Collections	1	–	–	1	1
Museum Property	$ 7,136,866	–	–	$ 7,136,866	$ 7,136,866
Total Assets	$18,087,349	$ 333,899	$ 42,181,448	$60,602,696	$61,917,984
Liabilities and Fund Balances					
Accounts Payable	$ 705,412	$ –	$ –	$ 705,412	$ 552,509
Accrued Liabilities	294,917	–	–	294,917	285,236
Accrued Pension Contribution	165,496	–	–	165,496	202,810
Deferred Revenue					
Contributions	75,000	–	–	75,000	–
Pension Gain	213,057	–	–	213,057	158,234
Restricted Contributions	–	5,790,401	–	5,790,401	–
Other	58,887	30,238	–	89,125	153,485
Due to (from) Other Funds	$ 7,710,922	$(6,930,047)	$ (780,875)	–	–
Total Liabilities	$ 9,223,691	$(1,109,408)	$ (780,875)	$ 7,333,408	$ 1,352,274
Museum Property Fund Balance	$ 7,136,867	$ –	$ –	$ 7,136,867	$ 7,136,867
Fund Balance	1,726,791	1,443,307	42,962,323	46,132,421	53,428,843
	$ 8,863,658	$ 1,443,307	$ 42,962,323	$53,269,288	$60,565,710
Total Fund Balance	$18,087,349	$ 333,899	$ 42,181,448	$60,602,696	$61,917,984

STAFF PUBLICATIONS

DEPARTMENT OF ANTHROPOLOGY

BRONSON, BENNET

1983. (with K. Smith and K. Petersen) Using Remote CP/M Computer Systems. *Microsystems* July , pp. 5-9.

(with W. Rostoker, J. Dvorak, and G. Shen) Casting farm implements, comparable tools and hardware in Ancient China. *World Archaeology* 15(2):196-210.

1984. (with I. Glover) Archaelogical Radiocarbon Dates from Indonesia: A First List. *Indonesia Circle* 34:37-44.

(with W. Rostoker and J. Dvorak) The Cast Iron Bells of China. *Technology and Culture* 25(4):750-67.

(with W. Rostoker and J. Dvorak) Studies on an Ancient Chinese Object with a Bronze Coating. *Journal of Historical Metallurgy Society* 18(2):89-94.

(with P. Charoenwongsa) Sites of the Highest Possible Priority: Targets for Archaeological Research in Thailand. *SPAFA Digest* 5(2):9-11 (Bangkok).

(with I. Glover) A List of Southeast Asian Radiocarbon Dates, Part I: Indonesia. *SPAFA Digest*, 5(2):26-29.

Feldman, Robert A.

1983. El Niño: Recent Effects in Peru. *Field Museum of Natural History Bulletin* 54(8):16-18.

El Niño Strikes Again. *El Chasqui* (Journal of the Peruvian Arts Society, Chicago), July pp. 4 & 14.

From Maritime Chiefdom to Agricultural State in Formative Coastal Peru. In *Civilization in the Ancient Americas: Essays in Honor of Gordon R. Willey*, eds. Richard M. Leventhal and Alan L. Kolata, pp. 289-310. Albuquerque: University of New Mexico Press.

(with C. R. Ortloff and Michael E. Moseley) The Chicama-Moche Intervalley Canal: Social Explanations and Physical Paradigms. *American Antiquity* 48(2):375-389.

(with Michael E. Moseley) The Northern Andes. In *Ancient South Americans*, ed. Jesse D. Jennings, pp. 139-178. San Francisco Freeman and Company.

(with Michael E. Moseley) Hydrological Dynamics and the Evolution of Field Form and Use: Resolving the Knapp-Smith Controversy. *American Antiquity* 49(2):403-408.

(with Michael E. Moseley, Charles R. Ortloff, and Alfredo Narvaez) Principles of Agrarian Collapse in the Cordillera, Negra, Peru. *Annals of Carnegie Museum* 52(13):299-327.

1984. (with Michael E. Moseley) Vivir con crisis: percepcion humana de proceso y tiempo. *Revista del Museo Nacional (Lima)* 46:267-287.

KOLATA, ALAN

1983. (ed., with Richard M. Leventhal) *Civilization in the Ancient Americas: Essays in Honor of Gordon R. Willey,* Albuquerque: University of New Mexico Press.

Chan Chan and Cuzco: On the Nature of the Ancient Andean City. In *Civilization in the Ancient Americas: Essays in Honor of Gordon R. Willey.* eds. Richard M. Leventhal and Alan L. Kolata. pp. 345-371. Albuquerque: University of New Mexico Press.

The South Andes. In *Ancient South Americans*, ed. Jesse D. Jennings, pp. 240-285. San Francisco: Freeman and Company.

LEWIS, PHILLIP

1984. (with Phyllis Rabineau) A New Look for the Pacific Research Lab. *Field Museum of Natural History Bulletin.* October 1984. pp. 6-9.

MOSELEY, MICHAEL E.

1983. Desert Empire and Art: Chimor, Chimu, and Chancay. In *Art of the Andes. Pre-Columbian Sculpted and Painted Ceramics from the Arthur M. Sackler Collections*, ed. L. Katz, pp. 78-85. Washington D.C.: the Arthur M. Sackler Foundation.

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David M. Waisten

Charles M. Johnson (left) and Chirkina I. Chirkina, members of the Security and Visitor Services staff, oversee the coming and going of all materials at the shipping dock: traveling exhibits, provisions, and mail.

David M. Waisten

John P. Harris, fossil preparator, Department of Geology, gently guides into position one of the largest known bones in the world of science: the femur of a Brachiosaurus. *The 675-pound bone was discovered by the late Elmer S. Riggs, former Field Museum paleontologist, in Colorado, in 1900. Much of Harris's work involves the restoration and cleaning of fossil material, as well as the fabrication of copies of bones that are exact to the finest detail.*

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Sales Clerk Gloria Clayton with the Museum Store's large selection of African carvings.

David M. Walsten

Assistant engineers Kevin Kirby (left) and Phil Savio pose proudly with one of the Museum's giant boilers. Until the late 1960s, the boilers were fueled with coal; today the fuel is gas. The Engineering Division of Building Operations is comprised of a chief engineer, an assistant chief engineer, six licensed stationary engineers, and five assistant engineers. In addition to operating the high-pressure boilers, they maintain the entire heating-ventilating-air-conditioning environment for the Museum.

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TOURS FOR MEMBERS

Last Call!

Kenya Safari

September 6 – 23, 1985

THIS ADVENTUROUS TOUR will take you through diverse habitats featuring rolling savannah plains, and the breathtaking slopes of Mounts Kenya and Kilimanjaro. From safari lodge to luxury camps, this tour makes accessible the land of lion, elephant, rhino, and giraffe. It is especially exciting for the photographer since our safari vehicles will provide clear shots of gazelle and zebra as they race across the grassland. Bird lovers will relish the optional extension to the Great Rift Valley (through October 1), where over 500 species of birds make their homes around Lake Naivasha alone. Visits to Nairobi and the Masai village of Narok provide a view of Kenyan life as well as an opportunity to collect souvenirs. Departure time is not far distant, so call the Tours Department now.

Egypt

February, 1986

EXPLORE EGYPT, the land of ancient mysteries. Journey from bustling Cairo, with its renowned Egyptian Museum, its mosques, minarets, and markets, into the ghostly silence of ruined cities, splendrous temples, and noble tombs. The 5,000-year-old Step Pyramid, the massive stone ruins of Karnak, and the Colossi of Memnon all beckon the curious and inspire respect for a culture as old as Western civilization itself. As you cruise the Nile, observe age-old scenes along the shore, for life in the fertile Nile Valley has changed but little. We encourage early enrollment, since spaces fill quickly for this breathtaking journey into the past.

Baja California

March 9-23, 1986

LESS THAN 50 MILES SOUTH of the U.S.-Mexico border begins a peaceful world of subtropical beauty—the Sea of Cortez (Gulf of California). Over 600 miles long, this gulf is a paradise for marine vertebrate and invertebrate life—and for those of us who enjoy its study. Field Museum members will have the opportunity to know this sea of wonders in a voyage that will all but complete the circumnavigation of the peninsula of Baja California.

Robert K. Johnson

The Pacific Northwest Explorer

Until 1973 road travel in Baja California required rugged vehicles and rugged souls. Even now less than 5 percent of the coast is accessible by road. And although for decades fishermen and scientists have found the region a treasure house of riches, it has escaped popular attention. In the 1970s world interest in whales grew. At the same time there was a dramatic increase in the numbers of California gray whales, and today each year from December through April, 15,000 gray whales visit Baja's Pacific lagoons to breed, give birth, and nurture their young.

It was our desire to organize a Field Museum tour to this area. All that was needed was a small, maneuverable, comfortable ship. We found it—the *Pacific Northwest Explorer*—and in January 1981 our first Field Museum circumnavigation from San Felipe to San Diego began. There were pelicans and hummingbirds, strange endemic plants, lovely scenery, and whales and dolphins beyond expectation. During this and the next two voyages we encountered not only many gray whales, but also fin, humpback, sei, and, the largest of all—blue whales. At San Benitos we walked among huge "hauled-out" colonies of northern elephant seals. And we saw more than 130 different birds and 120 fish species. →

TOURS FOR MEMBERS

Now is your chance to experience the solemnity and the life, the aridness and the wealth, the starkness and the beauty that is Baja California. Now is your chance to join Field Museum's 1986 tour to Baja California, to be led by Dr. Robert K. Johnson, curator of Fishes at Field Museum. Dr. Johnson is a highly experienced tour leader. This will be his fourth trip around Baja California. Special Expeditions, a division of Lindblad Travel, operators of the ship to be used, will provide several additional naturalists whose expertise will further enrich our experience. Our home for the voyage is the one-class, fully air-conditioned 143.5-foot MV *Pacific Northwest Explorer*, built in 1980. Early expression of interest and reservations are advisable.

For tour prices, itineraries, or other tour information, please write the Tours Office, at Field Museum, or call: 322-8862. We would be pleased to put your name on our special mailing list.

The Island World of Indonesia

March 21 – April 8, 1986

COMPOSED OF THOUSANDS of islands forming a vast archipelago, Indonesia is an ancient land of gentle peoples, rich and varied cultural traditions, and tropical landscapes of unsurpassed beauty. With its panoply of religions, art forms, rituals, and dances found nowhere else in the world, Indonesia confronts the visitor with a fascinating past; its history, myth, and legend are often inseparable. On an itinerary which has been carefully planned to include well-known sites as well as remote, verdant isles, we will travel aboard the ship *Illira* to destinations of immense beauty.

The Great Silk Route of China

May 21 – June 15, 1986

OUR FLIGHT FROM CHICAGO is direct to Tokyo. Then on to Beijing. After several days there, viewing such marvels as the Forbidden City and the 98-acre Tien An Men Square, we go on to Urumqi, Dunhuang, Lanzhou, Xian, Shanghai, and Guilin. Xian is of particular interest to archaeology buffs for here we find the vast life-size terra cotta army discovered as recently as 1974. We return to the U.S. via Hong Kong.

Stanton Cook, courtesy *Chicago Tribune*

China's famed Great Wall

Alaska

June 1986

VISIT ALASKA IN SUMMER! Explore magnificent waterways and vast parklands abundant with many species of birds. At Sitka, a marine wildlife rafting trip gets you started on this spectacular ornithological tour. From Juneau, a trip on the Mendenhall River offers unusual wetland viewing. From Anchorage one easily reaches Potter Marsh Bird Refuge and the Eagle River. Denali National Park (formerly called McKinley National Park) and the Glacier Bay cruise are special highlights. We conclude our trip with three days on St. George Island. Few people have visited this island, which boasts spectacular birding. For more information contact the Tours Department.

Grand Canyon/Colorado River Rafting Trip

August 22 – 31, 1986

WE'LL TRAVERSE the entire 300-mile length of the Grand Canyon by two motorized rubber rafts. Nearly 200 rapids, both large and small, make the journey thrilling, but you needn't be a "rough rider" to join in the fun. We will sleep on sandy beaches, swim in Colorado tributaries, hike to places of unusual geologic and anthropologic interest, sometimes through the most pleasant and enchanting stream beds and valleys, at times along waterfalls. Dr. Matthew H. Nitecki, curator of fossil invertebrates, will be our tour leader. Participants may enroll now with a deposit of $50 per person.

For further information or to be placed on our mailing list, call or write Dorothy Roder. Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

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FIELD MUSEUM OF NATURAL HISTORY BULLETIN

September 1985

The Arts of Mexico: September 21
Fiesta de Mexico: September 22

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of Natural History
Bulletin

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CORRECTION

The July/August issue of the Bulletin *(biennial report) gave an incorrect first name for the late Julian B. Wilkins, former trustee of Field Museum who died in 1984. The editor deeply regrets this mistake and tenders his apologies to Mr. Wilkins's family, to the Board of Trustees, and to readers of the* Bulletin.

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COVER

Reconstruction of radiocyathid, from the Lower Cambrian period (about 550,000,000 years old). The primitive organism, ranging from about two to six inches in length, was representative of an extinct group of earliest skeletal organisms, possibly belonging to the calcareous algae; it may also represent a failed evolutionary experiment. See "The Beginning of Life," page 7. Drawing by Zbigniew Jastrzebski, senior scientific illustrator.

Open Letter to Field Museum Members

Field Museum is fortunate indeed for the many thousands of Members who have continued to support it through the years. Thanks to these devoted friends, the institution has been able to vigorously pursue its primary goals of preserving, increasing, and disseminating knowledge of natural history.

Since 1979, the Museum has striven to keep membership fees at the same level. Rising costs, however, now make it necessary for the Museum to raise those fees. As of September 1, 1985, individual memberships will be offered at $30, family memberships at $35.

In appreciation for their loyal support, the Museum is offering current Members the opportunity to renew at the prior rate ($20 for individual, $25 for family memberships) through December 31. Memberships that expire after this date may be "prerenewed" at the old rate through December 31.

The benefits gained through Field Museum membership are numerous and lasting: from discounts on classes, tours, and purchases to the opportunity to discover—or rediscover—the exciting world of natural history. We cherish your continued interest and look forward to having you with us in the years to come.

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Events

Family Feature
The Arts of Mexico

Saturday, September 21, 1:00pm.
Ecology Hall, second floor.

Bursts of colored flame lighting the Mexican night sky explode on film to delight the whole family. Follow Marcelo Ramos and his family as they prepare the firework display for a fiesta in *Marcelo Ramos—the Firework Maker's Art*. Delight in *Pedro Linares—Papier-Mâché Artist* and understand the traditions this maestro's art serves. Explore the art and architecture of the Aztecs, Mixtecs, Zapotecs, and Toltecs, combined with murals of the 20th-century Mexican artist Diego Rivera. Develop your own picture of the life of America's original inhabitants by viewing the film *Mexico Before Cortez*.

This program is free with museum admission and no tickets are required.

Fiesta de Mexico

Sunday, September 22, 12:00 noon–4:00pm

An afternoon of festive dancing, artists at work, and activities for the whole family. In celebration of Mexican Independence Day and the opening of the special exhibit "Agustin Victor Casasola, Mexico, 1900–1938," Field Museum presents *Fiesta de Mexico*. Come hear the music and dance of Mexico. The lively rhythms of "El Mariachi Guadalajara" will accompany the colorful ballet folkloric by "The Mexican Folkloric Dance Company of Chicago, Inc." Selections include dances from northern Mexico, Veracruz, and Jalisco.

All activities are free with Museum admission.

Mexican Folkloric Dance Company of Chicago performs Sunday, Sept. 22.

CONTINUED⇨

CONTINUED FROM PAGE 3

Events

Edward E. Ayer Film Series

Thursdays in September, 1:30pm
James Simpson Theatre

September 5: *Great Railway Journeys: The Long Straight*
September 12: *In the Sweat of the Sun*
September 19: *Hawaii Revisited*
September 26: *Margaret Mead: Taking Note*

Mexican dancers will be accompanied by El Mariachi Guadalajara on Sunday, September 22.

September Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. The programs are partially supported by a grant from the Illinois Arts Council.

September

1 2:00pm. *China's Wondrous Animals* (slide lecture). Meet the real and imaginary animals of China and the lore and significance attached to them.

8 12:30pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

14 1:30pm. *Tibet Today* (slide lecture). Visit Lhasa and other towns now open to tourists.

2:00pm. *Traditional China* (tour). Examine the imagery and craftsmanship represented by Chinese masterworks in our permanent collection.

15 1:00pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

21 2:00pm. *Chinese Ceramic Traditions* (tour). Explore 6,000 years of ceramic art from our permanent exhibit.

22 12:30pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

29 1:00pm. *Welcome to the Field* (tour). Enjoy a sampling of our most significant exhibits as you explore the scope of Field Museum.

These public programs are free with museum admission and tickets are not required.

The Founders' Council
Serving and Learning

by Charles T. Buzek
Assistant to the President

Field Museum thrives because many people give. Time, money, expertise are generously given by a devoted few to move this great Museum along in its day-to-day tasks.

In the spirit of the old Chinese proverb that opines "it is better to light a candle than to curse the darkness," the Founders' Council of the Field Museum stands annually with a very timely "match." The most overt expression of this "match" is the annual gift each member makes to the Museum. A more subtle aspect comes from the support and advocacy that results as the Council introduces its members to the varied and complicated tasks of the institution. Through lectures, dinners, and tours, members have a chance to meet and hear the people who are "keepers of the flame." Recently, members met for a luncheon in the curatorial offices of Dr. William Burger, chairman of the Botany Department, after hearing Dr. Michael Dillon of that department recount his work in Peru. They then adjourned to a meeting with Dr. John Fitzpatrick, Chairman of the Department of Zoology, who had co-authored a recently published, highly acclaimed work on the Florida scrub-jay. On another occasion, Frank Yurco, a lecturer at the Museum, gave a fascinating talk on Ancient Egypt. As a special amenity, the evening offered members the opportunity to dine among the splendors of our Egyptian collection. They enjoyed an excellent meal while flanked by mummies, statuary, and tomb façades. Future Council plans involve a trip to Starved Rock and a dinner symposium, "Field Museum: Ambassador to the World," spotlighting the importance of Peru with respect to our collections.

Above: Thomas Eyerman makes introductory remarks in advance of the lecture which was among the highlights of the Founders' Council Egyptian Night. Right: Founders' Council members enjoying the luncheon break which linked the talks given by Dr. Michael Dillon and Dr. John Fitzpatrick. Photos by Ron Testa.
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The World of Agustin Victor Casasola, Mexico, 1900-1938

Thursday, September 12 through Sunday, November 3

One of the most important documentary photographers of the early 20th century, Agustin Victor Casasola, was a Mexican journalist who used photography as the most effective means of communicating with the largely illiterate Mexican populace. His life's work coincided with a period of turbulent social, political, and economic change in his country (1900-38), spanning the era between the government of Porfirio Diaz through the revolution to the creation of the modern Mexican nation.

This exhibit of his photographic works offers a unique opportunity to better understand the cultural mythology and political realities involved in the heritage of today's Mexico. The importance of Casasola to the visual documentation of Mexican history is comparable to that of Matthew Brady with respect to the American Civil War. This exhibition is the first major retrospective of Casasola with prints supplied through the Archivo Casasola, an official institution of the Mexican government.

Complementing the exhibit are two days of activities featuring the living, contemporary arts of Mexico: "The Arts of Mexico," on Saturday, September 21, and "Fiesta de Mexico," on Sunday, September 22. For details of these activities, free with Museum admission, see page 3.

General of the federal army, Rodrigo Paliza, March 1914 (detail).

President of the Mexican republic, Alvaro Obregón, Hortensia. Mexico City 1921.

Sanitary and transportation workers with the Mexican Regional Confederation of Workers, Mexico City, 1922.

Music hall dancers, Mexico City, ca. 1928.

Federal soldier with wife and child, 1913-14.

©Archivo Casasola, Mexico

THE BEGINNING OF LIFE

by Matthew H. Nitecki
Curator of Fossil Invertebrates

Photos Courtesy of the Author

There is a word the meaning of which has always eluded man: *life*. The understanding of the nature of life has been the most serious dilemma in the long history of human inquiry into the abyss of the unknown. When a creature not quite yet a man crawled from the cave of his unconsciousness, he faced the eternal tyranny of death, a cessation of his individual life.

The first deliberate effort to defy nature must have been caused by the discovery of the omnipotence of death. Man learned that there was no freedom, that his short sojourn on Earth was clearly defined, and that forces he could not control—the inhuman, the hostile, blind fury of the unconscious universe—will overpower every man and forever banish him to eternal darkness and nothingness.

In his fear, man turned to the examination of the past. The past appears motionless, unchanging—therefore secure and hence beautiful. Man began to see life as part of a larger condition of oneness with nature, and with life that appeared to him eternal and divine. Thus, man began to think of life's origin.

The problems of the origin of life have been the most unyielding stumbling blocks in the intellectual growth of man. Political, religious, and philosophical systems have been built upon the various hypotheses of life's origin in general, and of man's in particular. Wars, atrocities, pain, savage and brutal deeds were inflicted upon fellow men in the name of different doctrines of life and human origin. It is only quite recently that man has attempted analytical and rational studies of life.

Perhaps it is only in our era, possibly because of Charles Darwin, that such inquiries are possible. Perhaps only our revolutionary time, with changing morals, art, patterns of behavior, a whole gamut of social change and scientific adventure, could foster a suitable atmosphere for such studies.

Origin of Life

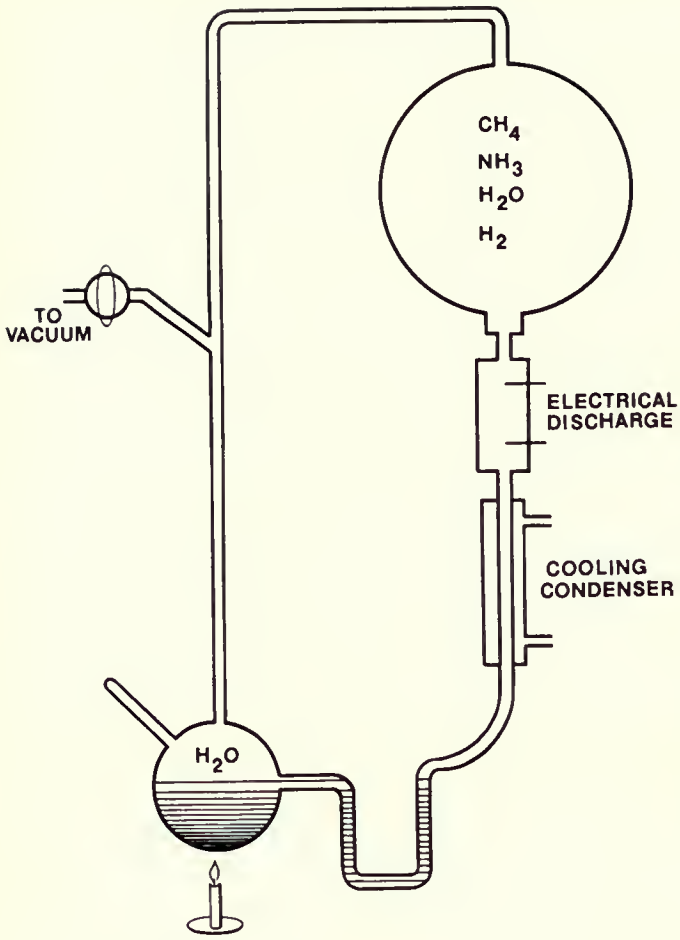
All studies, including the study of life's origins, change continuously, sometimes sweepingly. Medieval philosophers knew that life was created in the days of Methuselah. The eighteenth- and nineteenth-century geologists believed that life was eternal, perhaps beginning when the world itself was created. Darwin had life evolve. Twentieth-century postulates considered life on Earth to have originated from inorganic matter via electric discharge, ultraviolet radiation, or other magical sparks.

All human activity, including scientific beliefs and works, reflects the larger system of beliefs of a particular culture. For this reason no scientific or religious world views are permanent, and today's dogmas become tomorrow's cobwebs of antiquity. One such mid-twentieth century subculture is the study of the origin of life, which occupies, as ever, the finest intellects among the biological, geological, biochemical, and astronomical disciplines.

Why did man begin rational investigations of nature and origin of life so late in his development? Because the problems were too difficult, the chemistry of living processes unknown, and no information on the early condition of the Earth was available. Nor were studies of other planets made for comparison with early Earth. Thus, it was not until the mid-twentieth century that we began the experimentation and the buildup of rational models of life's origin. And we do not yet know much about it. It is remarkable that the origin of life, known to pious men with such rock-solid certainty for ages, is the least understood phenomenon in biology.

Whether defined in terms of molecular biology, biochemistry, or paleontology, life is not only qualities, states, or experiences, but processes that because of their complexities defy our comprehension. Whether these processes define chemical interaction, genetic inheritance, or evolutionary change, they are still processes. At what state of complexity a process should be referred to as *living* cannot be easily answered. It also cannot be answered whether a molecule, a protein, or a gene is living or not.

There are, moreover, other uncertainties about the definition of life. It is believed that life is an end result of a series of events that, when understood, will make life understood. Without ever questioning that life in general follows the same laws that control the arrange-



Stanley L. Miller's 1953 apparatus for producing amino acids under possible primitive Earth conditions.

ments of these events, what is generally implied is that once these laws of events are understood, life will be ultimately understood. But these claims may not be correct, because of the entirely different levels of complexity, elements of chance, unpredictability, and accidents that may require altogether different models and different statistics to comprehend.

We know possible pathways through which life could have proceeded. We think that life, once started, has been continuous, without interruption. We know that the individual organism dies, but that the germ cell continues on and is eternal. Life itself appears immortal, continuous, continually changing. We have gained a realization that life is a process, and that this process takes place when conditions are right. Life is a process that has capacities to reproduce, to change, and to reproduce these changes. However, what is passed from one generation to another is information. Organisms do not change; information does.

It has been generally assumed that organic compounds formed after the Earth formed—more accurately, after the crust was formed. However, the discovery of amino acids in meteorites offers an alternative explanation that the complex organic compounds on Earth may have accreted at low temperature and at the time prior to, or simultaneous with, the formation of the Earth.

Astronomical calculations suggest that the luminosity of the sun four billion years ago was only 60 percent of what it is now. Such low luminosity would produce less heat for the early Earth, and unless some greenhouse effects were operating, the temperatures at the beginning of the Earth were below the freezing point of water. It is possible that the Earth during its early history lay under mile-thick ice.

It follows that the "higher" forms of life capable of synthesizing from simple compounds all of their needed materials (autotrophs) evolved before the depletion of available organic matter. These organisms, through their metabolic activities, produced the oxygen in the atmosphere, which in turn controlled the evolution of organisms capable of living in an oxygenated environment (aerobic forms). However, solar radiation could also cause the atmosphere to be oxygenated by decomposing water and carbon dioxide.

From geologic and biologic considerations it is assumed that the first organisms did not require free oxygen to maintain life (they were anaerobic) and that they obtained their nourishment from the available organic compounds (they were heterotrophs).

It is safe to say that great revolutions (which may have lasted for vast periods of time and appear revolutionary only from a distance)—the origin of life, self-nourishment, and synthesis of chemical compounds with the aid of radiant energy (autotrophism and photosynthesis)—all occurred long before the first fos-

sil record, some 3.5 billion years ago. The other major events—the emergence of sexuality, respiration, and the formation of multicellularity—all occurred later, yet before the appearance of the abundant fossil record of plants and animals. The final inventions of animals, invasion of land, and great complexities of social evolution occurred at an accelerated tempo in the later part of Earth's history.

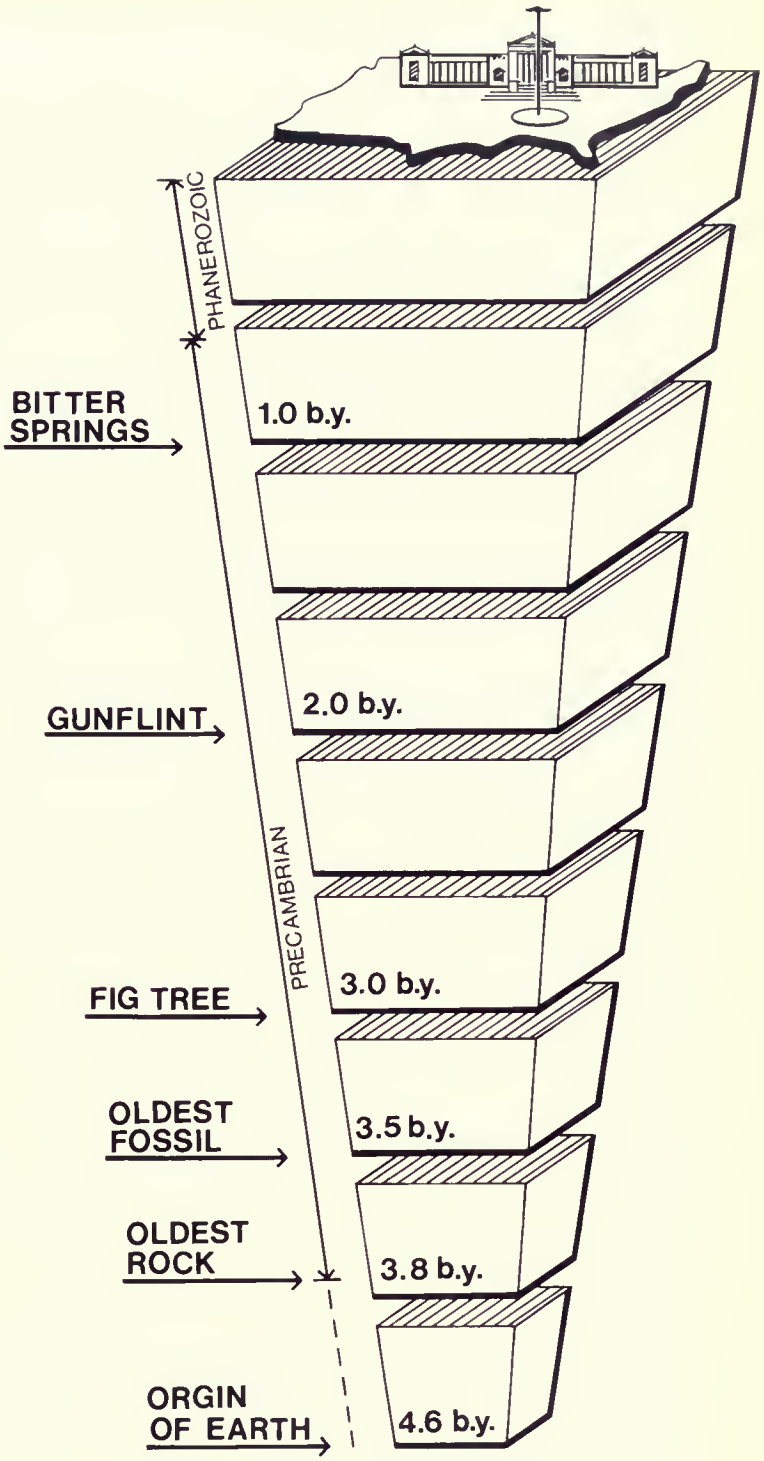
The First Organism

What was the first organism? We can of course speculate, but we will probably never know exactly. The difference between living and nonliving may be semantic where the earliest organisms are concerned, and it may be impossible to decide whether the fossil represents a living or nonliving entity. The exact date of the origin of life cannot be known. Since life cannot be defined with mathematical rigor, the time at which it first started depends upon our definition of life, and that date may therefore include a considerable period of time.

The assumption made that all living organisms are truly related to one another by common ancestry cannot any longer be accepted literally. It surely seems reasonable to assume that if life development was gradual, more than one molecule or assemblage "evolved" to be living. If this was the case, there could have been many "first" organisms. There is no reason to doubt that early organic molecules were also subject to change and experimentation, and many systems under suitable conditions crossed the boundary of "living." The early organisms were unlikely to possess complicated anatomical, biochemical, physiological, enzymatic, and other tools to deal with fluctuating environments.

We generally assume that the first organism was small, uncomplicated, and without any special organs or apparatuses. It had no powers of locomotion, no abilities to perform complex biochemical or physiological functions. Hence, it could not have been an autotroph, which is capable of combining simple, inert matter into complex, living, high-energy matter. Therefore, early life could not have flourished in soil, on exposed surfaces of crystal faces, or even in protected shallow marine pools. Early life appears to have been necessarily restricted to more protected, less changing, less fluctuating, stabler areas of the surface of the Earth.

The ability to cope with a changing, unstable, or fluctuating environment requires a mechanism for adjustment to these changes. In order for an organism to live in fresh water, it must be able to control diffusion and interchange with the environment; in order to withstand effects of drying in the air, protection of water content has to be assured. There is no need to cite many examples of locomotion, control of temperature change, gas pressure, radiation, daily changes,



Generalized scheme of Earth's history ("b.y." = billion years). Drawing by Zbigniew Jastrzebski.

Reconstruction of Precambrian shoreline some two billion years ago. The structures are stromatolites that reached several feet in height. Similar stromatolitic heads are known from certain isolated areas of today's oceans. Drawing by Zbigniew Jastrzebski.

illumination, and so on; suffice it to say that organisms require abilities (or apparatuses) for control of these changes in the environment.

The rate of evolution is greatly influenced by population size, geographic dispersal, isolation, and the complexities of organisms. The simplicity of early life was its built-in conservatism. Little dispersal was possible at the early period of life; hence, slow rates of evolutionary innovations in a great part of the Precambrian resulted.

Over the Hill?

The possibility, however, exists that early organisms on Earth had more abilities. André Lwoff, the great French biologist, suggested that evolution is a downhill race. He visualized the first life as capable of total synthesis, and he saw living organisms as having lost most of their synthetic abilities. Although it is true that animals are dependent upon plants, the idea that the proto-organisms were superstars, capable of all synthesis, has been discarded by most investigators for the reason that such organisms would have to originate outside of the solar system or at least somewhere other than Earth. Yet the fossil organisms are either the autotrophic blue-green algae or bacteria (the blue-greens appear to differ from bacteria only in their photosynthetic activities; hence, they are now known as cyanobacteria); their living representatives today certainly possess these biochemical powers.

How was food provided for the first organisms? Was the sea indeed full of the diluted soup of organic molecules, and did the organism move to a new area as it depleted its immediate surroundings of nutrients? Or was there movement of water that carried "food" to the organism? Were there convection cells, changes in pressure and water current; and how did organisms behave in them? Or perhaps there is no need for nor any evidence of hot dilute soup of organic matter. Perhaps the inorganic molecules became the first "organisms" that learned survival and propagation, and perhaps the inorganic molecules became the "first" life. Maybe all the early organic matter was made by and from inorganic molecules, just as organic matter must be made outside of the solar system. Finally, the first inorganic organisms may have had an altogether different biochemistry from the later organic organisms. Clays without carbon, living organisms without organic matter!

Precambrian

Geologic time is commonly divided into Precambrian and Phanerozoic. Phanerozoic is the time of evident life. Cambrian, the first Phanerozoic period, began about 600 million years ago. The Earth is considered

to be about 4.5 billion years old; therefore, the Precambrian encompasses approximately four billion years, or nine-tenths of all the Earth's history—an unbelievably long period of time!

There are two reasons for a distinct Cambrian-Precambrian boundary. One is that fossil animals with hard skeletal elements are found above and slightly below this separation line. A second is that Cambrian rocks often rest upon Precambrian with great unconformity or hiatus of the record. Generally, Precambrian rocks are either remnants of old worn down mountains or continental shields. Precambrian rocks are generally more twisted, deformed, and upturned than younger rocks. In many parts of the world the Precambrian consists of granites, deformed crystalline metamorphics, and other igneous rocks. In other places there is a great thickness of sedimentary and volcanic rocks and, except for the absence of fossil animals, they are not substantially different from rocks of later periods.

The oldest fossils so far known are 3.5 billion years old. Therefore, life has been present on Earth for at least the last seven-ninths of the Earth's existence; only one-fourth of the Earth's history appears to have been lifeless. It is, however, possible that eventually we will find life in still older rocks. The older the rocks, the more rarely they appear at the surface.

But what we know now is that major events in the history of life took place prior to the Cambrian period. It was an immeasurably long time, representing the first six-sevenths of the known history of life. The tempo of biological inventiveness and change was incredibly sluggish, yet all major developments of multicellularity of plants and animals, origin of sexuality and social organization, and all the complexities of life known today took place in the Precambrian.

Ironically, individual death also originated in the Precambrian. Individual nonaccidental death is unknown among one-celled organisms, since they continuously divide. (It may be that the first organisms continue to live today!) Such death is known only to those larger organisms that are differentiated into body cells and sex cells; the wages of sex are death!

In such forms the sex cells, when put to use, are eternal, as all microbes and blue-green algae are, and only the vehicle of genetic continuity, the organism itself—the body—dies. Death thus is a necessity of life, a part of growth of the sex cell, which discards its bodily "booster" after its journey has been completed.

All of the Precambrian rocks are immersed in the sea of time, the sea that is almost opaque to examination, with most traces of life permanently obliterated. Rocks yield but a few of their mysteries. Occasionally "windows" are found that allow us a closer examination of Precambrian seas. We have five such major windows into the Precambrian life.

The oldest fossils, representing actual anatomical entities 3.5 billion years old, appear in the Warrawoona Group of Western Australia. The second are simple spheroids and stromatolites from the Fig Tree Formation in South Africa. The next significant record of Precambrian fossils is the much younger Gunflint Formation of Ontario, about two billion years old. From this time on a number of other, more or less important finds are scattered through the Precambrian; algal megafossils are found in Montana; diverse cyanobacteria and possibly the first eukaryotes in California. But the best studied is the Bitter Springs flora of Australia, only about one billion years old. The animals from Ediacara Hills in Australia are the youngest group; in fact they are just below the Cambrian.

The Oldest Record of Life

The oldest rocks found on the surface of the Earth are meteorites, almost all of which are 4.6 billion years old. When we assume that meteorites and the Earth formed at the same time, and that the time was always uniform, then 4.6 b.y. must also be the highest limit of the age of the Earth. The oldest terrestrial rocks from the shores of West Greenland and from Zimbabwe, in Africa, are around 3.8 b.y. old. These, particularly the Isua supracrustal samples from Greenland, are now well known, though their interpretation is still controversial. The Isua rocks contain banded iron formations and an isotopically light form of carbon. This has suggested to some researchers that by the Isua time, photosynthesis was already occurring, implying the presence of microbes. However, such interpretations are dependent on a particular model of banded iron formation and on an assumed absence of other than a biological dissociation of water, and a subsequent release of oxygen. Thus, while the Isua rocks attest to the antiquity of the Earth's crust, they tell us little about the earliest life.

The first unquestioned evidence of life comes from the Warrawoona Group in North Point Barite Mine in Western Australia. This consists of at least five different kinds of cells, but all appear to be cyanobacteria. These microbes were extracted from certain kinds of silica and have a distinct filamentous habit with a possible presence of cell membranes. They are extremely rare, not well preserved, and difficult to assign to any group; this is about all that can be said about them.

The Fig Tree Formation

The second oldest known microscopic fossil organisms, found in the Fig Tree Formation, come from black cherty rocks (types of silica) that are about three billion years old. They already consist of cells and were almost certainly photosynthetic; they are therefore already on

a "higher" rung of life! One of these is the bacterium-like *Eobacterium isolatum;* a second is a spheroid, aquatic, most probably photosynthetic alga-like *Archaeospheroides barbertonensis.*

These fossil forms, together with recent bacteria and cyanobacteria, are placed in a great group of organisms called prokaryotes. The living world is divided into organisms whose cells contain a nucleus (eukaryotes, meaning truly nucleated) and those devoid of a nucleus—prokaryotes. The prokaryotes reproduce only asexually, without the union of specialized sex cells. Because they have no organized nucleus and are sexless, they are considered more primitive than eukaryotes. Caution must be exercised not to consider blue-greens and bacteria as simple or primitive forms. They are simple only in structure, in lack of nuclear membrane and cell organelles. In their synthetic vigor and in their chemistry, they are as complex as many living organisms.

Primitive or not, prokaryotes have a complex internal morphology, as seen under the electron microscope, and are ecologically highly adapted. Today's blue-green algae and some bacteria manufacture their food by means of photosynthesis. Their photosynthetic pigments differ from those of "higher" plants in that they are in lamellae, or layers, located peripherally around the body.

Nevertheless, photosynthesis, the build-up of highly complex, high-energy, organic molecules from the simple, nonliving, low-energy molecules, is a most complex process.

The blue-greens, as a group and as individual species, are uniquely varied in their ecologic adaptations. They live in fresh, salt, or brackish waters; they are successful on glaciers; in hot springs, and in soil, both as parasites and as free-living organisms. They man-

This page: *Precambrian fossils from Great Slave Lake, Canada.* Opposite page: *living stromatolites in Shark Bay, Australia.*

ufacture their food by means of photosynthesis and are capable of efficient utilization of various light frequencies. Certain of these algae require oxygen; others do well without it. All possess gliding locomotion, and some filamentous forms can move relatively fast through water. Certain species can prosper where no others can survive; hence, they thrive in rich pastures of highly polluted waters and in human cesspools. Thus, cyanobacteria are highly adapted and appear primitive only in their lack of some anatomical organelles.

This is one of our great difficulties: if the first organisms were blue-green algae or bacteria, then they possessed very specialized cell walls capable of controlling the inflow and outflow of salts, they were able to control their internal environment, and they must have had a very long life history prior to the time of deposition of the Warrawoona sediments.

The intriguing question then is, was André Lwoff right? Was the protoorganism really capable of total synthesis; hence, is evolution going downhill? Were the blue-greens or bacteria the first organisms? Were they already so advanced? Was there enough time in the Precambrian before the Warrawoona to make life? Could life have come from another planet?

The Gunflint Formation

The Gunflint Formation, our third major window, is approximately two billion years old, and because it contains iron ore, it has been extensively studied for a long time in the field and in detail under the microscope. For many years some geologists believed that the Precambrian iron was formed by microorganisms. The Gunflint iron formation is now a very famous geologic formation because well-documented Precambrian

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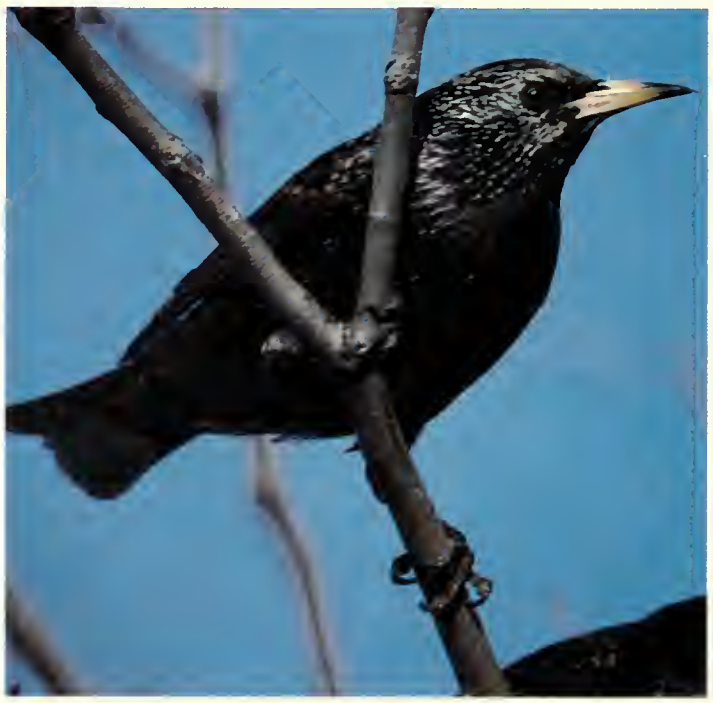
In Quest of Starlings

by William J. Beecher

Photos by the Author

Quite possibly the long episode at Field Museum was the best time of my life—when I was at the same moment the poorest and richest I have ever been. I owned nothing more valuable than a camera and binocular but was at the height of my scientific creativity. At the famous "lunch club," which convened daily in Karl Schmidt's herpetology lab, I bubbled with enthusiasm over my latest discoveries. Karl, who was mother hen to all the young zoologists, was indulgent. Curator of Paleontology, Bryan Patterson, observed tolerantly that I was experiencing the euphoria that comes to every young scientist when he is opening the mother lode of a new field of investigation.

I mined that mother lode for seven years, day and night, as though I were reading a marvelous book and could not wait to see what was on the next page. I was locked in a study of the evolutionary relationships of the 60 families of songbirds, which make up more than half the 9,000 species of birds in the world. After 30 months of war in the South Pacific, I was back in the Field Museum bird range on a University of Chicago Ph.D. project. In the alcove farthest from the office I dissected birds through a binocular microscope far into the night. Rules required that I use only one light after dark and, when leaving, I found my way along pitch-black corridors the entire length of the building to the one lighted stairwell that led from the third floor to the



Common starling

front door exit. When I was not drawing my dissections I was typing notes with an old typewriter on a large specimen drawer set on end, which I could straddle with my long legs. I chose this over a table because I could tilt my chair back to reflect from time to time!

It was now 1946 and I had begun my rich experience in the bird range in 1935 as a volunteer. In those days spent labelling bird skins laid row on row in drawer on drawer a deep curiosity possessed me about the relationship of songbird families to each other. I never doubted the species placement in the finch family or tanager family or warbler family by such ancient (and even extinct!) taxonomists as Hellmayr and Ridgway, but I knew that the family groupings had been made by ornithologists who used only study skins and intuition. Most of the bird had been thrown away!

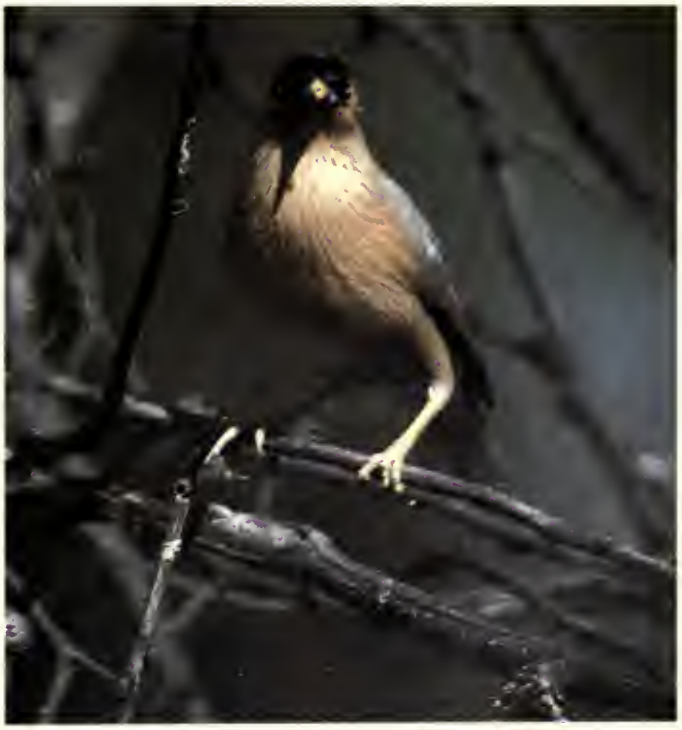
Fortunately, Rudyerd Boulton had built up the "spirit collection" of birds (those preserved in alcohol) while curator of the Bird Division in the 1930s—and now Dwight Davis, curator of Anatomy, encouraged me to dissect these specimens in a study of the functional anatomy of the feeding mechanism in birds. It was after I began to realize that the jaw muscles of a warbler had a diagnostic pattern different from that of a tanager or a vireo that I could see how my dream of showing the relationships of families to each other might come true. It was suddenly clear that songbirds differed little from each other in the anatomy of the body as a whole but differed a great deal in the head region, as the emerging families adapted to specialized feeding on insects or nectar or fruit or seeds. In time it began to seem that the seed-eating finches formed the terminal twigs, as the latest innovations, in this tree of relationships I was building. The insect-eating vireos and warblers seemed to be simpler, more primitive, so I was inclined to place them in the trunk, with the fruit- and nectar-eating tanagers in the larger branches between the two. It was not lost on me that this agreed with the fossil record of the flowering plants to which the songbirds were obviously adapting. The plants with numerous seeds were last to evolve, and so were the finches that eat them. It made evolutionary sense and it was elegant!

At the end of seven years I had dissected all of the spirit-preserved specimens of songbirds in Field Museum, as well as in New York's American Museum and Washington's Smithsonian. I had also had specimens sent to me from Europe and had visited New York and Washington—but I shall leave that. All of the above is merely stage-setting for the story at hand, with which I now proceed.

Quite early in the game I dissected a European starling and found its jaw musculature and accompanying

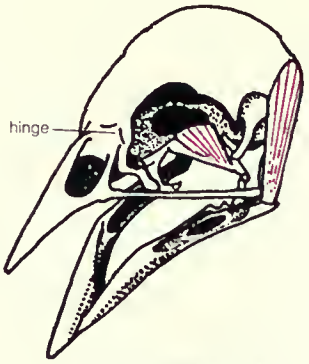
Bank myna

Chinese starling

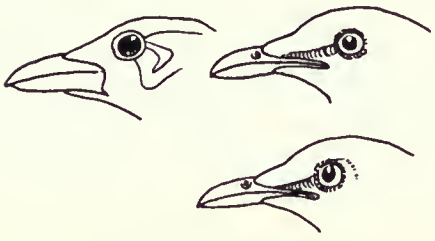


Dr. Beecher is director emeritus of The Chicago Academy of Sciences.

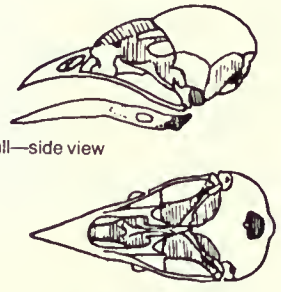
Jaw Musculature



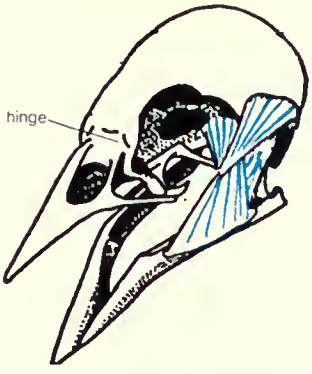
Protractor Muscles (red)
open the bill



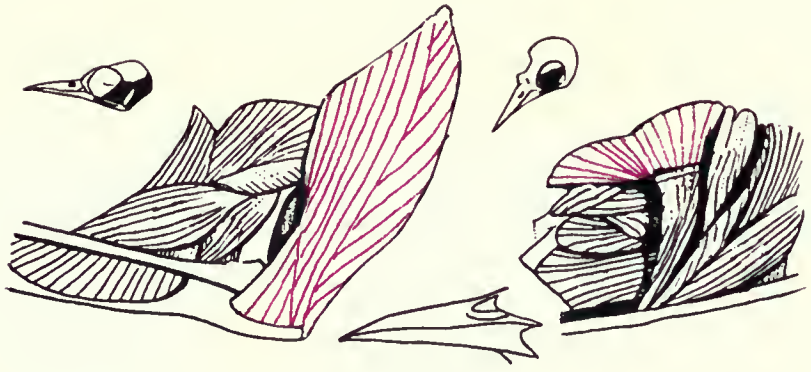
Eye position in myna species



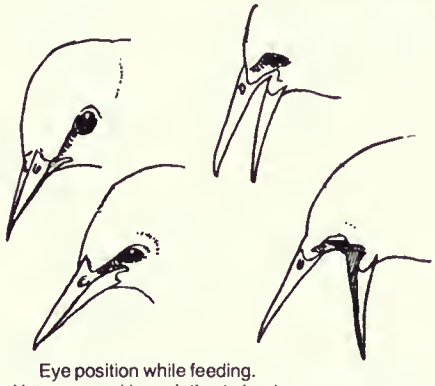
Mynas



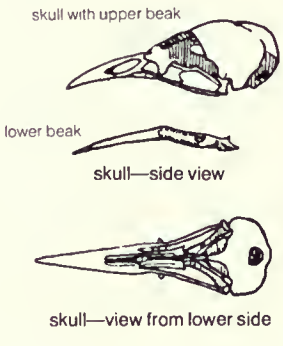
Adductor Muscles (blue)
close the bill



Jaw Musculature

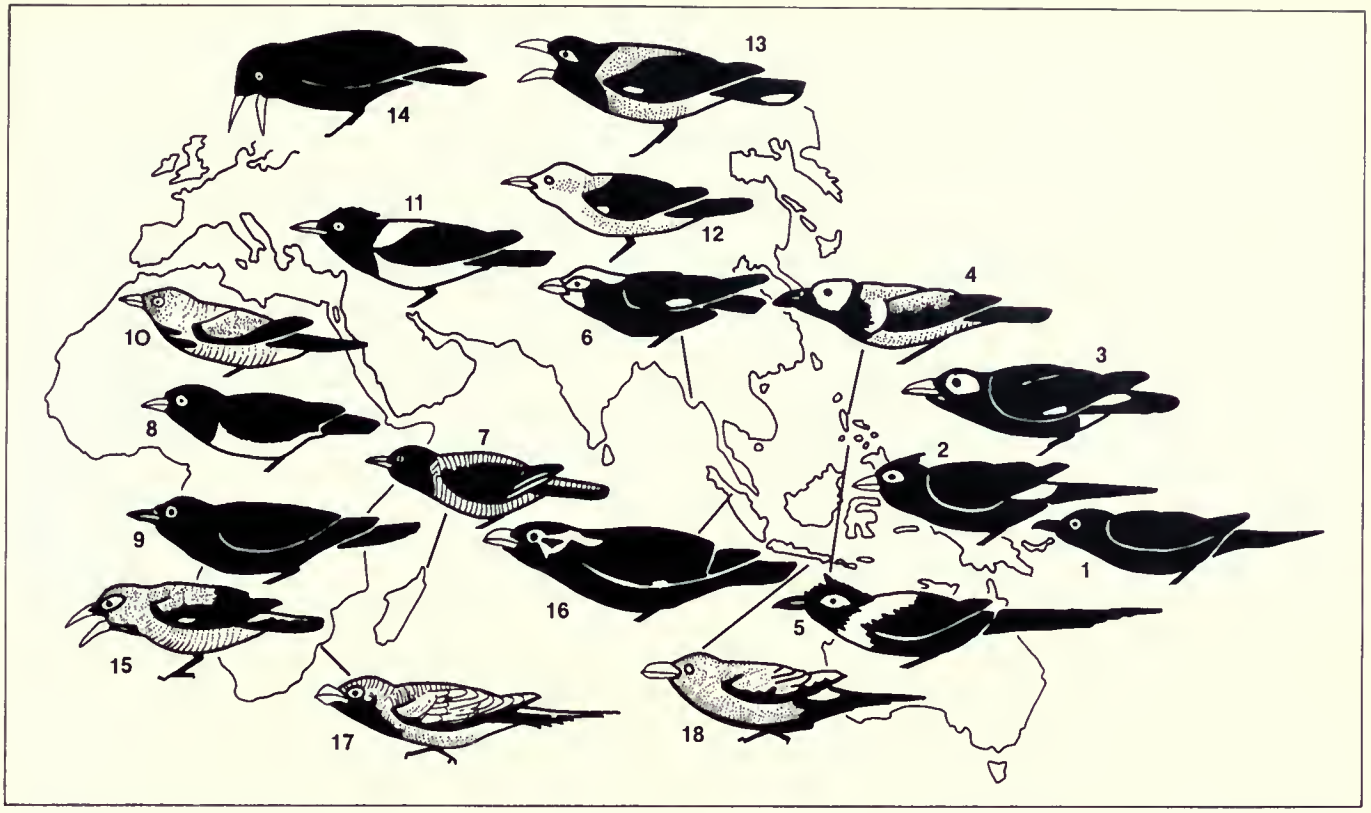


Eye position while feeding.
Note eye position relative to beak
as the latter is opened.



Starlings

Jaw musculature and skull adaptations in prying and nonprying birds (starlings and mynas respectively). Note in particular the size of the protractor muscles (red) in the starling relative to that of the mynas, and the relative narrowness of the starling skull. Drawings by the author.



Initial speciation may have begun with dispersal of ancestral forms throughout the islands and mainlands of the Indian Ocean, the primitive Aplonis *of the Pacific and* Lamprotornis *of Africa at extreme east and west limits. As genera disperse, north through Asia into Europe, the role of tropical, arboreal fruit-eater tends to give way to that of temperate, terrestrial insect-eater, with a complete restructuring of skull and jaw musculature.*

1: Aplonis, *2:* Basilornis, *3:* Mino, *4:* Sarcops, *5:* Streptocitta, *6:* Ampeliceps, *7:* Saraglossa, *8:* Cinnyricinclus, *9:* Lamprotornis, *10:* Neocichla, *11:* Pastor, *12:* Sturnia, *13:* Acridotheres, *14:* Sturnus, *15:* Creatophora, *16:* Gracula, *17:* Buphagus, *18:* Scissirostrum.

skull adaptations quite the strangest I would ever see in a songbird. It was little suspected before my investigation that the bird skull and its seven muscles function like a well-oiled machine—one of the simple machines of classical physics, a frame of rodlike bone levers hinging bill to cranium. One function of this machine is to raise the tip of the upper bill, hinged to the skull, when a pair of contracting pterygoid muscles thrust the frame forward against the base of the bill. Another function is to open the lower bill by means of a pair of muscles originating on the back of the cranium and attaching to the blades of the lower bill just back of the fulcrum, hinging them to the base of the skull. These muscles for opening the bill, called *protractors,* are generally small and weak. The *adductor* muscles, which close the bill, are expectedly large and powerful. Only the European starling had it all on backwards!

I looked at my dissection in amazement, then dissected another specimen. In a few minutes there was no doubt. The protractors and their leverage were enormous, while the adductors were reduced. A blind man could see that the starling must pry powerfully! At the same time there was the most extreme narrowing of the skull in front of the eyes to be found in any songbird. So the pryer also looked forward between the widely-spread upper and lower bills to search for his food. But no bird observer had ever noted this! The next morning, crouched behind the marble balustrade that overlooks the south lawn of Field Museum, I watched a flock of starlings for fifteen minutes and confirmed that what I had predicted in a laboratory happens in nature. It was March and the dry grass mat hid its insects well. All the starlings were opening their bills repeatedly to the extreme and peering between them!

But the problem was only in its beginning phase. I had already dissected mynas and other Asiatic starlings and found the jaw musculature and skull to be normal, with no evidence of prying at all. I determined that sometime, when my seven-year thesis was finished, I would have a pleasant time running the mystery of the European starling down. Associate Curator Bob Blake,* my first mentor and best friend in the Bird Division, had early acquainted me with R. Bowdler Sharpe's "Handlist of the genera and species of birds," published in the British Museum at the turn of the century. In this work, which probably

Emmet R. Blake is now curator emeritus of Birds.

still occupies a shelf in the division office, Sharpe had broken the 111 starling species into *two* families. He was a notorious "splitter," taxonomically-speaking, but maybe the old boy had been onto something. Would I find when I examined all the species that there was a family of "pryers" and one of "normal" starlings? The answer must wait and the project was set aside.

It was not until 16 years later, in 1962, that I could pick up the trail again. Like a detective seeking clues, I visited the American Museum in New York and the National Museum in Washington in quick succession, also observing the behavior of living starlings in the collections of the Bronx and National Zoos. I was looking for ritual "gaping," when posturing starlings threaten each other. The Austrian psychologist and animal behaviorist Konrad Lorenz had discovered this in European starlings and we had exchanged papers and congratulated each other on discovering the same trait independently from different avenues of approach.

My life had changed and now I seldom worked less than 12 to 15 hours a day on exhibits and education programs as director of the Chicago Academy of Sciences. Seventeen years passed before I could find time to complete the investigation, mainly because a suitable paper was needed in that institution's *Bulletin* series.

The story as it has emerged in completed form has elements of evolutionary plausibility and elegance that persuade me I have most of the truth now about the starling family, Sturnidae. I have been able to dissect nearly all of the 111 species, and, no—Sharpe was not right. There is only one family, and the gradation from "normal" to prying species is a smooth one.

The family appears to have originated in the islands and on surrounding continental shores of the Indian Ocean, where a veritable whirlpool of currents, coupled with abundant typhoons and the millions of years available, might account for the relatively large number of species. The origin of new species requires the interrupted gene flow that comes only with geographic isolation and there was ample opportunity for that. When a tropical deluge rages in the mountains of such tropical islands, whole log jams made up of living jungle emerge from the mouths of streams and put to sea on ocean currents. Given the time and the abundance of islands in the Malaysian-Indonesian areas, numerous colonizations were made. Given luck, some of them survived fierce competition in new homes to become viable populations of the small size needed to fix favorable mutations and form new species.

Most of these Indian Ocean starlings, particularly at the eastern, or Malaysian end, are mynas. Tree-dwelling fruit-eaters, they have the typical broad-headed, broad-billed, wall-eyed look of fruit-eaters and have little ability to turn the eyes forward. Another group is made up of the incredibly shiny and iridescent glossy starlings, which change from purple to green, depending on the light. I studied them in Africa and the Solomon Islands, where they have been pushed to the periphery of the tropical portion of the family's range, though there is good reason to think that these are relatively primitive starlings, from which the rest may have specialized. There are, of course, the woodpecker starling of Celebes and the oxpeckers of Africa, both with feet modified, the former for clinging to trees, the latter for clinging to the game animals with which they are customarily associated.

But it is on the Eurasian continent north of the Indian Ocean that there began the specialization of the prying adaptation that would recast the whole skull architecture in a major group of starling species, changing them from arboreal fruit-eaters into ground-dwelling insect-eaters. Working northward, this group would culminate in the European starling which, forsaking the tropics, penetrated for good into temperate climes to beat primary insect-eaters (which never had a fruit-eating background) at their own game.

The prying adaptation is already seen in the tropical Indian myna, widely colonized as associates of humans throughout the Pacific Islands to Hawaii. The adaptation is only partial in that the curved culmen, or ridge, of the upper bill (in contrast to the straighter culmen of the European starling) is the hallmark of a primary fruit-eater. Still, this yellow-billed brown bird with its white wing patches, whose cheerful chatter was constantly in my ears during 30 months in the Solomons, could be seen occasionally prying the grass mat under coconut trees in army bivouac areas. The prying apparatus was already there, but there was very little pinching-in of the the skull before the eyes for forward vision.

So it remained for the European starling to make the full adaptation with its beautifully slender, straight and narrow bill, with its skull deeply pinched in before the eyes, with its enormous protractor muscles acting on special bony levers for added power. One feels that prying power when a pet starling tries to open the closed fist for a special treat. This is the adaptation that permitted this remarkable species to succeed in the temperate zone of Europe and, upon introduction into New York in 1890, to spread entirely across the United States from east to west in the next 50 to 60 years. The Chinese starling, lacking this full prying adaptation, was introduced into British Columbia in 1897, but has not spread at all. Its food is about 60 percent fruit and 30 percent insects, whereas the European starling's diet reverses this.

But the real key to starling success is *how* it gets the 60 percent of its food that is insects by probing the grass mat and earth. When our native insect-eaters are driven south in fall by descending temperatures, it is because their insect food is unavailable to them. But

"When presented with a small wooden matchbox, he instantly pried it open in one movement like a child performing a trick and quickly threw all the matches out."

starlings, probing the grass mat, still find dormant insects, eggs, and cocoons aplenty. Some clue to the success with which they ply their prying may be seen if we look at the latitude in which they reach optimum numbers—our nation's capital, where they breed and roost on public buildings. We may guess at the reason. Whereas New York and Chicago have 90 to 120 snow-covered days a year, Washington has only 10 to 30; thus, far more days for starlings to probe the grass mat.

The common starling has been a menace to native birds because of its aggressiveness in taking over natural nesting holes in trees and nest boxes, especially those once occupied in rural areas by bluebirds. However, cities have been long abandoned by most of our native birds, and starlings have some fetching traits that help to make a Chicago winter more bearable. As pointed out to me by my friend, C. H. Channing of Clear Lake, Washington, who loves to make tape recordings, starlings are great imitators. A starling singing to himself on a sunny, cold, winter afternoon atop a tree is imitating all the sounds in the neighborhood—barking dogs, other birds, boys at their games—all rather quietly. If there is another starling nearby—and there always is—they are having a contest. Too many starlings and it becomes a caterwauling jumble.

Starlings are also comical. A foraging starling, glossy plumage reflecting purple and green, his erratic gait throwing his body this way and that at every step, head bobbing back and forth in his rapid-peering technique of feeding, is really funny. In his greediness, one locomotion cycle overtakes another and he may abandon technique altogether and run ahead a yard for an insect he has spotted or he may jump into the air. The spasmodic prying, however, punctuates every feeding mode. Starlings are always trying and, when native aerial insect-eaters like martins and swifts fly south, the starlings try their hand at flycatching, since aerial insects are still abundant. They totally lack the grace and ease at this displayed by kingbirds and swallows and, after a protracted zigzag flight of half a minute, they perch and rest awhile.

A starling may make an amusing pet. One of my colleagues at Field Museum in the late 1940s was Lloyd DuBrul, professor of Oral Anatomy at the University of Illinois, who loved to make studies of the biomechanics of the skulls of wild species. When he expressed a desire to raise a wild bird, I suggested a starling because I wanted to know how early in development the prying begins. Raised and fed by DuBrul's wife, Florence, a concert pianist, when he was still an almost formless blob of protoplasm, Pic (his French name) did not know he was a bird. He was, in fact, a person in his own right, much like a small boy, and a spoiled one! He became the joy of the household, flying through all the rooms freely, teasing the dog, who never demurred. He began to pry immediately, sipping Lloyd's cocktail, probing in his beard, under his shirt cuff. When presented with a small wooden matchbox, he instantly pried it open in one movement like a child performing a trick and quickly threw all the matches out. When a finger was poked at him, he stretched himself tall, raised his hackles and opened his bill to the maximum in response to this threat, his forward-turned eyes glaring at the finger tip through the gape of the bill. Pic learned to whistle a little French tune very accurately and used to perch on the shoulder of his mistress during her long hours of practice on the piano, accompanying the arpeggios with his own original version. He entertained that household and its lucky visitors for many years. FM

LIFE *continued from p. 15*

organisms were first discovered in it. There were other earlier claims of Precambrian fossils that, however, have been later discarded or simply put aside and forgotten. The modern study of Precambrian paleobiology began in the 1950s with the pioneering work on the Gunflint by Prof. Elso S. Barghoorn, Stanley A. Taylor, and their colleagues.

A wealth of material, in comparison with the Warrawoona and Fig Tree formations, is obtained from the Gunflint. Organic compounds strongly suggestive of the breakdown of chlorophyll are present. The free-floating organisms of the surface of the sea and the bottom dwellers are represented. All the Gunflint fossils appear, however, to have lacked nuclei and to have been prokaryotic.

Stromatolites

Stromatolites, sometimes called cryptozoans, are calcareous, finely laminated sedimentary structures produced by algae, bacteria, and so forth, mostly blue-greens. Although they are organic in origin they do not represent the actual body of the organism. Stromatolites of the present time, particularly from Shark Bay, Western Australia, allow for comparison with the Precambrian fossils. The Australian forms are similar in appearance to some of the Precambrian fossils and consist of large bodies made of algal film that trapped the fine sediments into distinct headlike structures. Well-formed, distinct Precambrian stromatolites can be seen in Upper Michigan along the shores of Lake Superior.

The ancient stromatolites from the area around Canada's Great Slave Lake represent one of the most fossiliferous formations known. They consist of columns that may be fifty feet high, and beds of these mounds hundreds of feet thick have been traced for more than 150 miles! The recent stromatolites are found only in the very restricted shallow areas of the sea floor devoid of animals. The Precambrian stromatolites on the other hand are very common, abundant, and cosmopolitan. They may owe their luxuriant growth to the absence of grazing animals, particularly marine snails.

The Bitter Springs Formation

The Bitter Springs Formation in central Australia is about one billion years old. Prof. J. William Schopf and his students at the University of California at Los Angeles in a series of very important publications, described the flora of the Bitter Springs Formation. These fossils, like other Precambrian floras, are preserved in chert. Originally formed around still-living organisms as a gel, chert preserves the living morphological structures with most unusual fidelity. Today chert sometimes forms on the sea bottom. The preservation of fossils in chert is such that the remnants of actual cell division, interpreted as various stages of mitosis, have been observed. The Bitter Springs flora consists not only of numerous prokaryotic bacteria and cyanobacteria, but also, for the first time, of well-documented nucleus-containing organisms, the eukaryotes.

All living things other than bacteria, blue-greens, and viruses (viruses consist of only nucleic acids and proteins, and no one knows where to put them) are eukaryotes. The eukaryotic cells are generally larger than the prokaryotic. One-celled eukaryotic algae have, in addition to a nucleus, the food-manufacturing chloroplasts and cytoplasm which sustain growth, and control through a very complex cell wall the exchange of materials with the environment. Many living eukaryotes are microscopic, but the best known eukaryotes—mammals, insects, worms, trees, grasses, roses, mushrooms, and so on—are large, many-celled, highly specialized individuals with many organs.

All life is capable of self-reproduction, but only eukaryotes have great variability in this respect. There are many reasons why organisms reproduce. The most apparent reason is to increase the number of cells that can specialize and increase their efficiency. The reason always given in textbooks is preservation of the species.

There is nevertheless a necessity to reproduce which is a result of growth. We can geometrically resolve a spherical cell into three properties,—diameter, mass and surface. When diameter doubles, surface quadruples, but mass increases eight times! Therefore an imbalance is created, and the surface which provides for entrance of nutrients and removal of wastes becomes inefficient, and cell division is triggered.

Cell division, though a disruption of growth, is a necessity of life. All prokaryotic organisms, bacteria, and blue-green algae reproduce this way. They pinch in the middle and form two new cells. This process continues forever, and even if cells remain attached to one another as in filamentous blue-greens, the resulting "colonies" are with little or no differentiation of cells.

The eukaryotic organisms differ from the prokaryotic in having a nucleus, which controls reproduction and coordinates general activities. When, because of growth, a small eukaryotic organism divides, the nucleic material divides in a precise and complex way. In this process the content of the nucleus divides into chromosomes, which possess genes, the primary carriers of genetic material. The genetic material is divided into pairs, and the germ cells, gametes, and eggs form. In eukaryotes the new individuals originate from the union of two germ cells that are sexually different.

Among prokaryotes "like begets like." Among eukaryotes like does not exactly beget like; but each time there is a minute change, which has given rise to the great spectrum of fossil forms and great diversity and blossoming of life. Sexual reproduction allows

for the genetic system, in which the variable characters of plants and animals, as seen appearing from generation to generation, are due to paired units of heredity—the genes. This, in turn, generates the great genetic diversity.

The combination and recombination of ancestral traits, and introduction of new traits offer new characters, from which nature selects the best adapted or rejects the less fit. The great revolution of the invention of sex offered more varieties of life and was only possible among eukaryotes. A great thing is sex, and great are its advantages! It first happened some time before the Bitter Springs time, for among Bitter Springs fossils we already have eukaryotic organisms!

The Ediacara Fauna: A Biologically Failed Experiment?

The first fossil animals have been described from the Pound Sandstone in the Ediacara Hills of South Australia. Fossils found there consist of an unusual and rich assemblage referred to as the Ediacara fauna, and are known through the work of Prof. Martin F. Glaessner at the University of Adelaide. The Ediacara animals are interpreted as various well-preserved jellyfish, related organisms very similar to living sea pens, varieties of segmented worms, a very primitive arthropod possibly related to trilobites, and some unknown extinct organisms.

What is also unusual about these fossils is that their preservation is in the form of an impression in sand, and that they are "naked" organisms without skeletons. The preservation of soft-bodied organisms is indeed rare in the fossil record.

Lately, however, Prof. Adolf Seilacher of the University of Tübingen offered a radically different interpretation of the Ediacara fauna. He claims that the identification of about 70 percent of all Ediacaran species as coelenterates was wrong; that instead, most of these "medusoids" represent trace fossils (tracks and burrows in soft sediments). The nature of the enclosing sediments, and the mode of preservation of the remainder of the fossil species suggest to Seilacher that they cannot be assigned to any known phyla. He believes that these forms had a cuticle that was not subject to bacterial breakdown, and more importantly, that these "animals" were most strange in their unusual way of nutrition. He sees their nutrition as a sort of autotrophy, and the organisms themselves as gutless and mouthless creatures feeding through the entire body surface instead of through inner digestive organs. Thus, their supportive cuticle may have been biomechanically hydraulic, somewhat in the manner of an air mattress!

The Ediacara fauna is found just below the transition of Cambrian and Precambrian, and may be almost 100 million years older than the youngest Cambrian remains. Similar faunas, also consisting of impressions, have been described from other Precambrian localities in England, many parts of the Soviet Union, and South Africa; in North America they are known in Newfoundland.

Although these fossils are extremely fascinating to paleontologists and are important for the study of the early history of life, they nevertheless are neither the first nor the most primitive animals. They are already of very large size, and some of them have a distinct symmetry, thus representing complex animals. The first animals were most probably naked (as the Ediacara forms were), small, and without muscular locomotion. They probably evolved only after the floating (pelagic) algae became numerous. The "first" animal remains still hidden in sediments.

The Phanerozoic

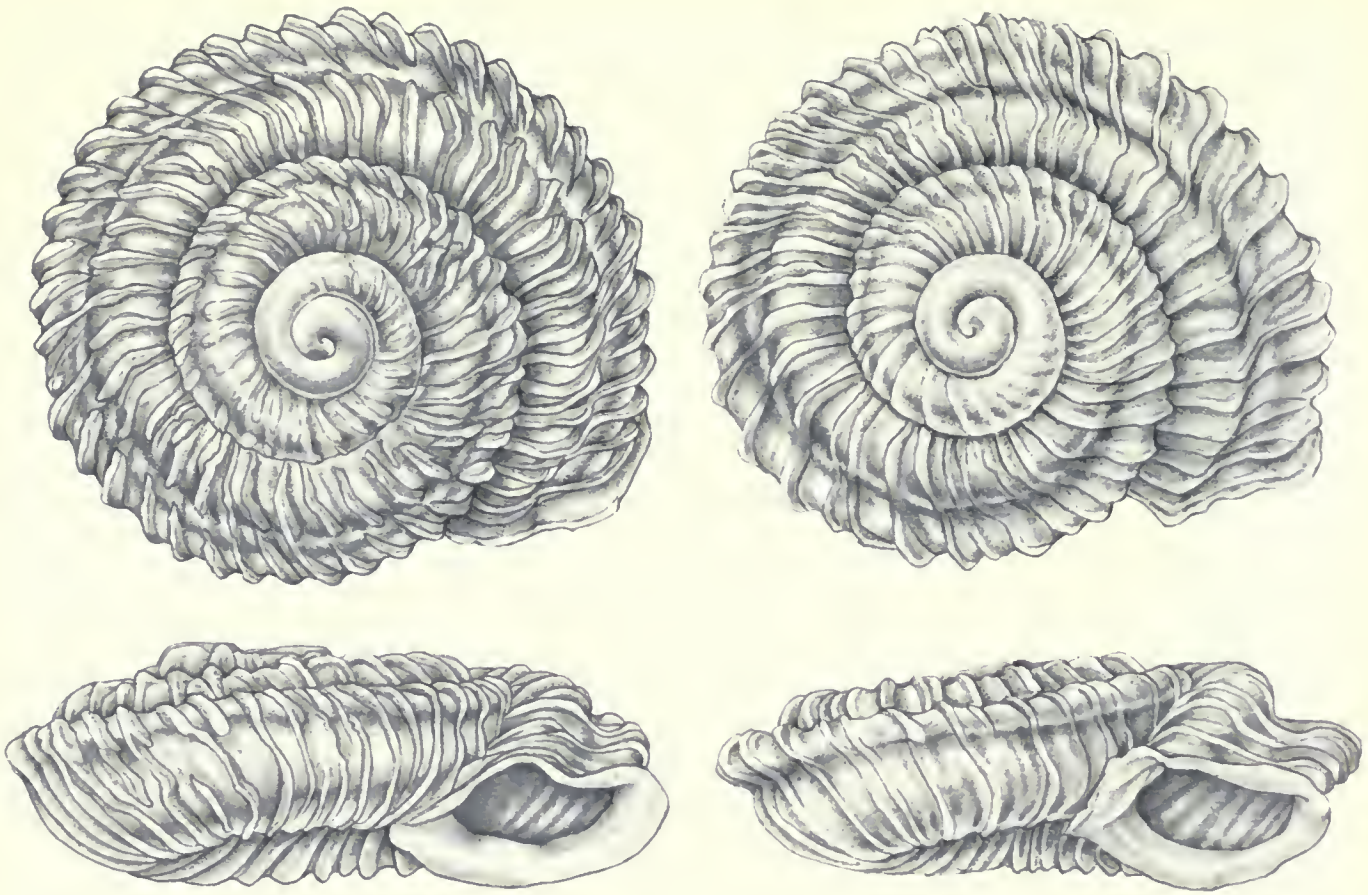
Life in the abyss of time has learned to utilize the inert matter and the seemingly unlimited solar energy and convert it into a complexity of organisms. Life has learned to use this vast energy for the sole purpose of living. Life has become interdependent upon other life and has become symbiotic internally, socially, and in the totality of living.

Into this stage entered yesterday, so to speak, man, a perfect eukaryote, with little ability to synthesize anything himself, but with the faculty to alter the synthetic pathways of other life to suit his own aims—a eukaryote organism with skills to use energy not only to build but also to destroy, a eukaryote angel of frightful destruction. This eukaryote organism has reached the greatest power of reproduction—a sexual superstar that outsexed all other eukaryotes and covered the Earth with its own kin.

But even from man's viewpoint, all life has but one aim; to live. Living is sacred to every organism.

It is curious that although all life has one aim, it is not united. Life conflicts with life, with nonlife, and with death. Life feeds upon other life, and finds enemies everywhere. But man brought the conflict of living with living, the conflict of man with all life, to new heights. One species feeds on all other life and on all nonlife. Man made all life, including his own, profane. Man kills bacteria and bald eagles, and lacks inhibition to slay fellow man. He gives Nobel prizes for an overkill and holocaust of the microbial world, bounty for dead eagles, and medals for war atrocities.

To man the life of fellow man is defiled and a conflict. Only his own individual life is holy. The Earth became a planet of a strange eukaryotic organism, the Earth became a human planet! And one day the remains of fossil man and his doings will be studied and a supreme magistrate shall judge man, the only judgeable eukaryote. And only the future knows what the leaves of the judgment book will unfold. FM



Top and side views of Mouldingia orientalis (left) *and* Mouldingia occidentalis, *shown about eight times life size. Drawings by Linnea Lahlum.*

this intent. Study of the material and then writing the description of the genus and species, with Illustrator Linnea Lahlum told to "go all out" on the shell drawings. These details are far too fine for optical photographs, and the many subtle differences between the species in shape and contour, all are exquisitely revealed by Linnea's skill and dedication. At last the manuscript on these and related species was completed. Drawings of shell and anatomy had been mounted and labeled, figure and plate numbers assigned and entered into the text. The final manuscript had been composed on a micro-computer, printed, proofed, corrected, reprinted, and copies duplicated, then assembled for mailing to Australia. Late in 1982, the manuscript and illustrations were submitted for publication to the Western Australian Museum. After being reviewed by other scientists, it was accepted for publication on July 22, 1983. Galley proof arrived in Chicago late in February 1984, then quickly corrected and returned to Perth. In one frantic week early in May 1984 I read the page proof in Perth while simultaneously assembling supplies for another field trip to the Kimberley. One last look at the silverprints on my return from the field work, and the monograph went to the printers and binder. However, by coincidence, I left Perth for field work in Namibia on the very day the book was finally published, June 30, 1984.

Thus, I did not see a printed copy until I returned to Chicago in mid-August. It was late November 1984 before the boxes of reprints, shipped ocean freight, arrived in Chicago from Perth. Illustrator Linnea Lahlum and I could then drive out to Mrs. Moulding's home, present her with autographed copies of the book, and have Linnea sign a copy of her magnificent drawing that will be framed and hung in Mrs. Moulding's home.

This all started with a note about a shell exhibit bringing people with common interests together, and sharing dreams.

My work on Australian snails continues. Areas needed to be visited in the future require helicopter hire, as no roads or tracks exist. Our collection of mollusks must continue to grow, and there still are many books that we lack. The help provided by the Mouldings continues to be essential to, and deeply appreciated by, Field Museum of Natural History. FM

TOURS FOR MEMBERS

Egypt

January 29-February 15, 1986

EXPLORE EGYPT, the land of ancient mysteries. Journey from bustling Cairo, with its renowned Egyptian Museum, its mosques, minarets, and markets, into the ghostly silence of ruined cities, splendrous temples, and noble tombs. The 5,000-year-old Step Pyramid, the massive stone ruins of Karnak, and the Colossi of Memnon all beckon the curious and inspire respect for a culture as old as Western civilization itself. As you cruise the Nile, observe age-old scenes along the shore, for life in the fertile Nile Valley has changed but little. We encourage early enrollment, since spaces fill quickly for this breathtaking journey into the past.

Baja California

March 8-23, 1986

CIRCUMNAVIGATING the Baja peninsula aboard the *Pacific Northwest Explorer* is an experience you won't want to miss. Dr. Robert K. Johnson, curator of Fishes at Field Museum and other naturalists will enrich your visit to the breeding lagoons of gray whales, fin, humpback, sei, and the largest of all—blue whales. In addition to some of the best whale-spotting in the world, you'll get a close-up view of colonies of northern elephant seal, schools of dolphins, myriad birds and fish, strange endemic plants, and very lovely scenery.

The Art and Culture of Indonesia— A Voyage to the Islands of the Java Sea

March 21-April 8, 1986

COMPOSED OF THOUSANDS of islands forming a vast archipelago, Indonesia is an ancient land of gentle peoples, rich and varied cultural traditions, and tropical landscapes of unsurpassed beauty. With its panoply of religions, art forms, rituals, and dances found nowhere else in the world, Indonesia confronts the visitor with a fascinating past; its history, myth, and legend are often inseparable. On an itinerary which has been carefully planned to include well-known sites as well as remote, verdant isles, we will travel aboard the ship *Illiria* to destinations of immense beauty.

The Great Silk Route of China

May 21-June 15, 1986

OUR FLIGHT FROM CHICAGO is direct to Tokyo. Then on to Beijing. After several days there, viewing such marvels as the Forbidden City and the 98-acre Tien An Men Square, we go on to Urumqi, Dunhuang, Lanzhou, Xian, Shanghai, and Guilin. Xian is of particular interest to archaeology buffs for here we find the vast life-size terra cotta army discovered as recently as 1974. We return to the U.S. via Hong Kong.

Alaska

July 2-16, 1986

VISIT ALASKA IN SUMMER! Explore magnificent waterways and vast parklands abundant with many species of birds. At Sitka, a marine wildlife rafting trip gets you started on this spectacular ornithological tour. From Juneau, a trip on the Mendenhall River offers unusual wetland viewing. From Anchorage one easily reaches Potter Marsh Bird Refuge and the Eagle River. Denali National Park (formerly called McKinley National Park) and the Glacier Bay cruise are special highlights. We conclude our trip with three days on St.George Island. Few people have visited this island, which boasts spectacular birding. For more information contact the Tours Department.

Field Museum Tours is offering two trips to the Grand Canyon in 1986. The first, August 13-22, is a geology study trip hiking down the north rim of the canyon, rafting for four days along the bottom and hiking back up the south rim. The second, August 22-31, is a rafting trip along the entire 300-mile length of the canyon by two motorized rubber rafts. Dr. Matthew H. Nitecki, curator of fossil invertebrates, leads both. A deposit of $50 per person will hold your space.

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, Il 60605-2499

0017195-00
Miss Marita Maxey
7411 North Greenview
Chicago, IL 60626

FIELD MUSEUM OF NATURAL HISTORY BULLETIN

October 1985

Dinosaur Days

October 5 & 6

Field Museum
of Natural History
Bulletin

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COVER
Field Museum's most recent permanent exhibit is this representation of a botany field trip to the coastal deserts of Peru. Based on the field work there of Assistant Curator Michael O. Dillon, the exhibit features a 4-wheel-drive vehicle such as Dillon uses, and all the trappings and equipment customarily to be found on such a venture. A narrated filmstrip supplements the exhibit, which is in the "Past, Present, and Future" hall, on the 2nd floor, east of the Museum Store. Photo by Ron Testa.

Open Letter to Field Museum Members

Field Museum is fortunate indeed for the many thousands of Members who have continued to support it through the years. Thanks to these devoted friends, the institution has been able to vigorously pursue its primary goals of preserving, increasing, and disseminating knowledge of natural history.

Since 1979, the Museum has striven to keep membership fees at the same level. Rising costs, however, now make it necessary for the Museum to raise those fees. As of September 1, 1985, individual memberships will be offered at $30, family memberships at $35.

In appreciation for their loyal support, the Museum is offering current Members the opportunity to renew at the prior rate ($20 for individual, $25 for family memberships) through December 31. Memberships that expire after this date may be "pre-renewed" at the old rate through December 31.

The benefits gained through Field Museum membership are numerous and lasting: from discounts on classes, tours, and purchases to the opportunity to discover—or rediscover—the exciting world of natural history. We cherish your continued interest and look forward to having you with us in the years to come.

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Events

The Multigravitational Aerodance Group extends choreography to airy realms.

Dinosaur Days

Saturday and Sunday, October 5 and 6
11:00am-4:00pm

Join us for a day of fun devoted to the incredible world of dinosaurs. Adults as well as children learn the facts and find out what is fiction about some of the most fascinating creatures that ever lived. Local scholars and Field Museum staff conduct demonstrations and activities throughout the Museum.

The very word dinosaur conjures up visions of lumbering giants grazing on exotic foliage and huge bird-like animals gliding through the air—the largest living things ever to fly. Featured this year is the Multigravitational Aerodance Group whose choreographic explorations extend the language of dance into the realm of the air. Aerodance's newest piece is choreographed around the theme of pterodactyls—flying reptiles. A new concept in the field of dance, Aerodance has been received by audiences with great interest and enthusiasm. The company moves freely through an assortment of structures such as tightropes, trapezes, slides, swings, hoops, and loops. Collaborating with Aerodance is William Harper, who is composing the score for this spectacular performance. Mr. Harper is the artistic director of American Ritual Theatre Company, ARTCO.

Donald Glut, who provided the screenplay for *The Empire Strikes Back* and is author of *The New Dinosaur Dictionary,* joins us this year with film clips and commentary in "Dinosaurs from Hollywood."

Museum staff help you discover what dinosaurs looked like. Make a *Triceratops* mask, a *Stegosaurus* hat, or a *Dimetrodon* puppet. Whatever dinosaur you choose, you'll be properly attired for a special puppet performance based on the story, *The Little Blue Brontosaurus.* Join the Dinosaur Olympics team and see if you can jump as far as *Tyrannosaurus* or high enough to look *Brachiosaurus* in the eye.

Dinosaur Days promise to be exciting and information-packed for all ages. All programs are free with Museum admission—no tickets required. A complete schedule of activities is available at the Museum entrances on Dinosaur Days. For more information call (312) 322-8854.

CONTINUED⇨

CONTINUED from p. 3

Events

October Weekend Programs

Each Saturday and Sunday you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. These programs are partially supported by a grant from the Illinois Arts Council.

October

13 12:30pm. *Museum Safari* (tour). Seek out big game from Africa and mummies from ancient Egypt as you travel through Field Museum exhibits.

20 1:00pm. *The Wonderful World of Plants* (tour). See the amazing plants of ocean, jungle, and desert, as well as the ones in your back yard.

26 1:30pm. *Traditional China* (tour). Examine the imagery, history, and lifestyles represented by Chinese jades and other masterworks.

27 12:00 noon. *Life in Ancient Egypt* (tour). Focus on the objects and practices which illustrate ancient life in the Nile Valley.

These programs are free with museum admission and no tickets are required.

Pinhole Cameras

Saturday and Sunday, October 12 and 13
1:00 – 3:00pm

After viewing the photographs of Agustin Victor Casasola, develop your own photographic skills. You don't have to buy a camera to do it—you can make one! Discover how simple it is to make a pinhole camera, and how easy it is to use. Create the perfect setting to take a family portrait or a beautiful still-life (we supply the props). Then enter the darkroom and develop your photographic masterpiece.
This program is free with museum admission.

Edward E. Ayer Film Series

Thursdays in October, 1:30pm
James Simpson Theatre

October 3: *Israel: Search for Faith,* 58 min.
October 10: *Poland: The Will to Be,* 58 min.
October 17: *Great Railway Journeys: Zambezi Express,* 60 min.
October 24: *Spain: The Land and the Legend,* 58 min.
October 31: *South Pacific: End of Eden?,* 58 min.

The World of Agustin Victor Casasola—Mexico: 1900-1938

Film Program
Saturdays, October 12, 19, and 26, and November 2, 2:00pm

Cinema has had a long and fascinating history in Latin America. Most of the films made during and after the Mexican Revolution were recreations of historic events. Movie images made history accessible to the mass population that was largely illiterate. As a result, and with financing from government and other sources, the extraordinary events of Mexico's national agony, the shattering revolution, were brought to the public by many Mexican filmmakers. The following film series documents this period of time:
October 12: *"Banda Del Automovil Gris,"* 90m. 1917
October 19: *"La Rosa Blanca,"* 75m. 1946
October 26: *"Vamonos Con Pancho Villa,"* 90m. 1931
November 2: *"Que Viva Mexico,"* 90m. 1931
These films are free with museum admission.

Margery Carlson
1892-1985

by William C. Burger
Chairman, Department of Botany

MARGERY CARLSON, former professor of botany at Northwestern University and a research associate of Field Museum for many years, died in early July at the age of 92. An energetic and adventurous woman, Dr. Carlson's primary interaction with Field Museum was through her plant collecting program in Mexico and Central America in the late 1940s and early 1950s. Using a station wagon or truck-camper as both vehicle and motel, Margery, together with her companion Kate Staley, was able to reach remote areas in southern Mexico, El Salvador, Honduras, and Costa Rica. Each expedition took several months and came close to or exceeded 10,000 miles of travel.

What was especially remarkable about Margery's field work was that both she and her companion were gray-haired ladies embarking on trips that would challenge someone half their age. The trips were not without adventures and minor mishaps. One expedition ended with the truck smashed at the bottom of a canyon but with the two women only slightly injured. Another adventure Margery loved to recount was the time she and Kate were eating lunch along the side of the road in northern Mexico, when they found themselves face-to-face with two men brandishing machetes and demanding money. Sizing up the situation quickly (these were two poor farmers and not dangerous bandits), Margery proceeded to admonish them in Spanish: "Don't you realize you could have scared us to death? And if that had happened you would never go to heaven!" Whereupon she invited them to have some lunch—which they did.

Dr. Carlson's collections are a significant part of Field Museum's premier holdings from Central America. Margery's research on the genus *Russelia,* in the snapdragon family, was published in our scientific journal *Fieldiana*: *Botany,* in 1957.

After retiring from teaching, Dr. Carlson played another important role as an advocate of conservation. She was the first secretary of the Illinois chapter of the Nature Conservancy and was especially active in the preservation of Volo Bog, the nature preserve at the southern part of Illinois Beach State Park, and a section of land along the Vermillion River, now part of Matthiessen State Park. The latter area boasts hundreds of yellow lady's-slippers and has been designated the Margery Carlson Preserve. It is not far from her home town of LaSalle, Illinois.

Margery brought more than her knowledge of botany to the battle for conservation. With an imposing physical presence, a clear voice, precisely focused energy and the authority of seventy years, she became an effective champion for the preservation of natural areas in Illinois.

Margery once remarked that she held the record for number of years served as an assistant professor at Northwestern University, her male colleagues having moved up the ladder at a more accelerated pace. But that remark was expressed more in humor than in bitterness, reflecting the very positive way in which she approached her work and her life.

Dr. Carlson's visits to the Field Museum over the last two decades were few and brief, but they always were special events. The same energy and enthusiasm that had sent her into Central America always were in evidence. We have greatly benefited from the many collections that were the product of her field work, and we admired her active role in conservation; but more importantly, we cherish the memory of a strong and enthusiastic colleague who lived a rich and active life. FM

Margery Carlson in the early 1950s with bundles of dried plants as well as living orchids, bromeliads, and cacti she brought back from southeastern Mexico., B-80585

FIELD BRIEFS

Ponce de Leon Retires

Dr. Patricio Ponce de Leon retired in August after 25 years with the Museum's Department of Botany. At that time he held the position of associate curator of cryptogamic botany, specializing in the study of fungi. Cryptogamic plants cover a wide diversity of life, including, in addition to fungi, algae, lichens, mosses, ferns, and other allies. When Dr. Pat (as he is known informally to the staff) first arrived, he found that the Museum's collections of many of these plant groups were poorly organized and little cared for. It was the reorganization and proper curation of this part of the herbarium that has been one of Dr. Pat's most important accomplishments.

Because of his knowledge of fungi, he was frequently called upon to help in cases of suspected mushroom poisoning. While physicians have already emptied the patient's stomach, identification of the specific kind of mushroom is often essential for proper treatment. The identification of such ingested mushrooms has been an important service provided by Dr. Pat over the years.

Dr. Pat's research has dealt with several groups of fungi, including representatives of the puffballs and earthstars. These studies have been published in *Fieldiana: Botany* and in other scientific journals. His collecting has been done in the Rocky Mountains, the Great Smokies, Alaska, and in Puerto Rico. He intends to continue his studies at the Museum during his retirement years, but spend part of each year in Florida.

Dr. Pat was born in Cuba, where he spent his first 45 years. He received his Ph.D. from the University of Havana and subsequently served on that university's faculty as professor of botany and later of biology. His father was also a botanist, having served for many years as director of Havana's Botanical Garden. This long and intimate experience in a Caribbean environment has made Dr. Pat a valued resource among his Field Museum colleagues for information about the biology of that part of the world. In a department with much research focused on the tropics, Dr. Pat's knowledge has been a particular asset.

Mycologists use a variety of chemical tests in their work, and these procedures often make it possible for them to determine the nature of certain materials. Anthropologists, in documenting the nature of artifacts, frequently ask: Is it animal, vegetable, or mineral? Using a few simple tests, Dr. Pat has often been able to distinguish the nature of materials being investigated and thus provide assistance to colleagues in other departments. Likewise, his natural fluency in Spanish has been often helpful in the preparation of carefully phrased translations.

While all these attributes have contributed to Dr. Pat's position as a respected and important member of the Botany staff, there is another quality that has made him special to all of us: His gracious manner and friendly nature have always given him a distinctive gentlemanly presence. This is what we will miss most of all while he is spending his winters in Florida, and look forward to when he returns. — *William Burger, chairman, Department of Botany.*

Kennicott Club Meets

The 583rd meeting of the Kennicott Club, a natural history society named for Chicago's first naturalist, Robert Kennicott, will be held at Field Museum on Monday, October 7, at 7:30pm. The evening's speaker will be Gary Galbreath, of the Department of Geology, who will discuss "Speciation in the World's Only Nocturnal Monkey *(Aotus)*." Dr. Galbreath's presentation will be preceded by a 5:30 dinner at the Three Happiness Restaurant, 2130 S. Wentworth.

Any person with an interest in natural history is invited to attend the Kennicott Club meetings. For further information, please write John Clay Bruner, vice president, The Kennicott Club, P.O. Box 4812, Chicago, Il 60680-4812.

Mycologist Joins Botany Staff

Gregory M. Mueller joined the Department of Botany on August 1 as assistant curator of Botany. A native of Belleville, Illinois, Mueller earned his B.A. and M.S. at Southern Illinois University and received his Ph.D. (1982) from the University of Tennessee. A mycologist (specialist in fungi), he has already published extensively on the mushroom genus *Laccaria*. He was a postdoctoral research fellow at Mountain Lake Biological Station, Pembroke, Virginia, in 1983, working largely on the *Laccaria* and related genera. Dr. Mueller worked for a year at the Institute of Physiological Botany at the University of Uppsala, Sweden. Following this he continued working on North American *Laccaria* as a postdoctoral research associate at the University of Washington.

Curators John Fitzpatrick and Robert Timm Promoted

John W. Fitzpatrick, who joined the Division of Birds in 1978, has been appointed curator of that division. This appointment follows by a few months his appointment to the chairmanship of the Department of Zoology, which includes, in addition to Birds, the divisions of Insects, Invertebrates, Mammals, Amphibians and Reptiles, and Fishes.

Fitzpatrick's research activities have focused on systematics, morphology, population biology, behavior, and community ecology; and he has published an impressive body of work in these areas, notably the highly acclaimed *The Florida Scrub Jay: Demography of a Cooperative-Breeding Bird,"* which he co-authored with Research Associate Glen Woolfenden. His contributions to the museum include service as head of the Advanced Technology Laboratories and chairmanship of the Science Advisory Council. Dr. Fitzpatrick also organized and hosted the much praised 100th annual meeting of the American Ornithologist's Union, held at Field Museum.

Mammalogist Robert M. Timm, who joined the Department of Zoology in 1980, has been promoted to associate curator of Mammals. He also serves as head of the Division of Mammals. Timm's research activities have focused on host-parasitic coevolution and behavioral ecology of neotropical bats. His work has been published in a variety of scholarly journals and has been presented at national and international meetings and university seminars. His work on host-parasite coevolution as exemplified by his presentation at the 1983 Spring Systematics Symposium (held at Field Museum) is particularly well known and highly respected.

Manual on Scientific Illustration by Zbigniew Jastrzebski

Scientific Illustration: A Guide for the Beginning Artist is the title of a handsome, 319-page manual by Zbigniew Jastrzebski, Field Museum senior scientific illustrator. The comprehensive, copiously illustrated work, published by Prentice Hall, introduces the reader to the technical aspects of drawing and painting any subject, whether it be pottery shards or a pollen grain.

Emphasizing that scientific illustration is an art *in the service of science*, the book

directly involves the reader in both observation and the transposition of the subject to paper. Every phase of drawing for a specific, professional purpose is covered. Included are: clear explanations of the drawing and painting process, descriptions of basic tools and techniques, detailed discussion of the precise steps leading to a finished rendering, projects to feature in one's professional portfolio, drawing exercises, and tips on subject areas in which the artist can specialize.

The book contains 150 illustrations, including ten color plates, many by the author. More than sixty other artists from countries around the world are also represented.

Jastrzebski has been a Field Museum artist since 1969. His new book is available at the Field Museum Store for $24.95 (10% discount for Members).

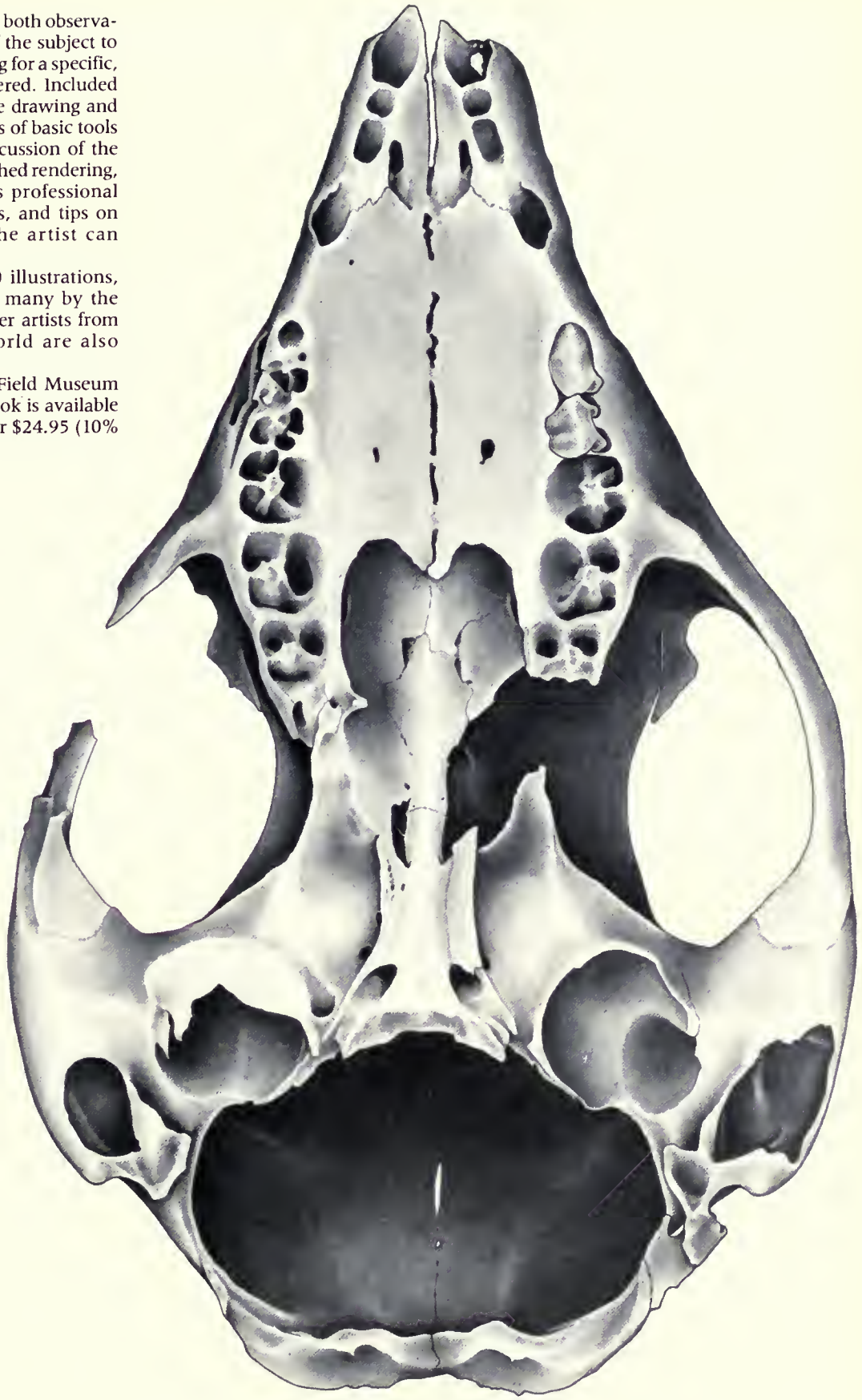

Illustration by Zbigniew Jastrzebski from his new book, Scientific Illustration. *Shown is ventral view of skull of* Potorous platyops, *Australian marsupial. The pencil drawing originally appeared in "The Mammalian Fauna of Madura Cave, Western Australia, Part VI," by William D. Turnbull, published in* Fieldiana, *Geology, New Series No. 14 (1984).*

Chicago's Lost M...

The author (right) and Greg Neise view bird life at Lake Calumet. Beecher's camera is fitted with 1250mm (25x) lens.

by William J. Beecher
photos by the author

It was still a good marsh when I first saw it in the 1930s. Broad, low stretches of bullrushes, cattails, and sedges reached out into the open waters of Lake Calumet. The strangled song of the now rare yellow-headed blackbird, the grating trill of the long-billed marsh wren, and the whinny of rail and gallinule were the dominant sounds of that low-flung, watery morass. To know how it appeared originally, one must look at my huge diorama in the Chicago Academy of Sciences, depicting a morning aggregation of water birds on the sandy ridge overlooking Lake Calumet. Eight thousand years ago that ridge was the shoreline of a Lake Michigan, twenty feet deeper than now. It was the shrinking of Lake Michigan away from that shore into its present smaller basin in southeastern Chicago and neighboring Indiana that left behind the immense marsh surrounding Lake Calumet, Lake George, and Wolf Lake.

There is a certain grandeur about a big marsh with its reedy vegetation billowing out to a flat horizon. Even in a tamed countryside, it still holds itself aloof as a symbol of wilderness. Land-going creatures are unwilling to flounder in its mud and gassy water—except for those restless members of the human hunting clan who appeared as the city arose. For, spring and fall, the great flocks of waterfowl and waders continued to fill the skies over the quaggy wasteland, despite the

Dr. Beecher is director emeritus of the Chicago Academy of Sciences.

smoking factories that were beginning to flank it. They were drawn by the same compelling geography that preordained the site of the city here. Lake Michigan was a barrier across all lines of travel.

I first heard the human history of the marsh from Malcolm Mecartney over lunch in the Standard Club deep in one of the canyons of the great city. His lawyer grandfather came to Chicago in 1870 from Lancaster, Pennsylvania, to become counsel for the Illinois Land and Loan Company. In 1865 there had been a land boom in Lake Calumet that had all the earmarks of the Florida land swindle much later. Lots were being sold on marshland once owned by Stephen A. Douglas without the buyers being informed that the land was under water. Envisioning a future port there, Mecartney advised Illinois Land and Loan to occupy the abandoned land under the Illinois Adverse Claims Act, buying out owners where necessary. When the company went out of business in 1913, it settled its debt with Mecartney's father by deeding over all its Lake Calumet holdings.

Malcolm Mecartney III, my informant, was a practicing lawyer in New Hampshire when the sudden death of his father forced him to come to Chicago to settle the Calumet property. It was messy. There were other owners and land parcels were scattered. He managed to work out a friendly solution with the lawyer representing the other landowners, fortunately securing that part of the Calumet shore underlain by eight feet of beach sand, which Mecartney mined. That mining laid the way for the era of the sanitary landfill, which has continued since about 1930. The city apparently began filling in the north edge of the marsh at 103rd Street about 1930, and 103rd was extended eastward across the north end in 1933. It was at this time that the Nickel Plate Railroad dumped slag over the landfill, creating the area later used as a marshalling yard for its piggyback trailer trucks. This landfill operation should have killed the marsh. It did not. In a way it ushered in its finest hour.

Northern phalarope

Sanderlings

Karl E. Bartel of Blue Island, a Chicago suburb, is one of that volunteer group licensed by the United States Fish and Wildlife Service to put numbered aluminum bands on the legs of wild birds for scientific study. He began his work as a young man on the cinder flats at 103rd and Doty in the summer of 1937. Using traps of wire mesh that he designed and paid for himself, he caught 16 semipalmated sandpipers, 2 spotted sandpipers and 1 Wilson's snipe the first day. In August of the following year he and his friend Alfred Reuss sighted a banded semipalmated sandpiper which, with skill and some luck, they succeeded in trapping. The number on the worn band proved that the bird was among those Karl had trapped only yards away the year before. As he reconstructed the story, the bird had escaped four hunters who bagged most of the original 16 sandpipers the next day, migrated south to Patagonia for the winter, then migrated to the Arctic islands of Canada to nest, before returning to Lake Calumet—a minimum distance of 14,000 miles. For 48 years Karl Bartel has continued to pursue thrills like this and is still banding birds. My brother Jim and I operated a banding station at Fox Lake, Illinois, for many years, lured by this strange excitement, and we knew Karl well.

The cinder flats became very popular and bird watchers came by hundreds and from considerable distances. Pete Peterson drove in from Davenport, Iowa, weekly to spread his mist nets for a Saturday and Sunday of banding. Twenty-five years ago you could drive your car so conveniently on the hard cinder surface right up to the shorebirds voraciously feeding at the water's edge. As in East Africa, your car was your blind. Afoot, you could never get near them. I filmed birds there for the Academy film library to my heart's content.

It was a strange time. The dying marsh was too vast, too vital to die. The cattails and sedges kept coming up through the cinders while the leachate from the adjacent garbage dump and from beneath the cinders so enriched the waters with nitrogen that shorebirds had a superabundance of tiny aquatic animals to feed on. We found eleven nests of Wilson's phalaropes in 1962 within that small area, more than could have been found in all the rest of the state of Illinois. In small patches and tufts of grass, horned larks and spotted sandpipers also nested. Bill Jarvis, my friend and field companion of many years, found that one of the lark nests had been lined entirely with dog hair. Not twenty feet away was the dried-up carcass of the unfortunate dog, which had been run over by a car. There were nests of shoveller ducks, green-winged teal, redwings. For the bird-watchers it was the best of times. Jarvis struck up a conversation with some youngsters one day while wandering across the flats. Upon learning that he was watching birds, they told him of seeing a group of *fifty* people with binoculars the day before. "And do you know what they was doin'? They was all lookin' at *one itty bitty bird!*"

Then, in the summer of 1954, tragedy struck. Shorebirds all over the cinder flats were turning sick. First a stricken bird lost the strength to stand on its feet. Then it could not even hold its head up. The poor creatures invariably died and there was nobody expert enough in bird diseases on hand to offer help, though state officials suspected the deadly botulism, caused by the anaerobic botulinus organism that sometimes breeds in polluted water.

Into this hopeless situation plunged an unlikely team of ministering angels. Amy Baldwin and Helen Lane, both nurses who worked nights, were out on the Calumet flats watching birds each dawn. When they

Long-billed dowitchers

Green heron

began to find sick birds, they rushed them to Dorothy and Dick Hoger, bird watchers known to have had success in helping sick or injured birds. With Harold Fetter, who also worked nights, the two nurses gathered birds each morning until noon, when they delivered them to the Hoger home in nearby Westmont. Without a thought, the Hogers turned their home into a hospital, handling as many as 200 birds a day, volunteering full time. With the unofficial help of a biologist at Argonne National Laboratory and state biologists, they learned that the disease laying the birds low was water-soluble lead poisoning, which attacked the liver and was stored in body fat.

With only the most practical medical advice to go on, their attack was simple, direct, and fast. A bird has a relatively short, straight gut. So—*you flush the poison through!* The birds were too weak to resist the treatment and it was the only action that could have saved them. The nurses showed the Hogers how to insert a gavage tube into the stomach and they simply pumped a sulfa solution loaded with Pablum right through each bird eight times a day. The Pablum was to give the bird a little nourishment, but the central idea was to starve away the poisoned fat. Dorothy was splendid through it all and Dick tells us how they used to release the recovered birds in Orland Slough at Southwest Highway and LaGrange Road because it had clean water. But first he banded them. That is how he learned that one pectoral sandpiper flew from Orland right back to the Calumet cinder flats and got sick all over again! Cleaned out once more, it was taken this time 100 miles away to Ottawa, Illinois. From there it joined the migration down the Mississippi, south to Louisiana, where it was shot a month or two later by a hunter. Sometimes the trials of wild birds trying to survive in a world dominated by people would make the angels weep!

From 1954 to 1958 the nurses and the Hogers made war against the lead poisoning, earning the Illinois Audubon Society's Conservation Award. An article by Isabel Wasson in the society's magazine details how they received a total of 1,971 birds, curing and releasing (once they got the hang of it) up to 40 percent. The species treated were: semipalmated sandpiper, pectoral sandpiper, stilt sandpiper, least sandpiper, solitary sandpiper, spotted sandpiper, Baird's sandpiper, buff-breasted sandpiper, western sandpiper, dunlin, killdeer, piping plover, semipalmated plover, golden plover, black-bellied plover, ruddy turnstone, greater yellow legs,lesser yellowlegs, sanderling, dowager, knot, northern phalarope, Wilson's phalarope, marbled godwit, mallard duck, green-winged teal, blue-winged teal, herring gull, ring-billed gull, horned lark, yellow-headed blackbird, and assorted tern species.

The list, together with the similar lists of Bartel and Reuss, documents the importance of the Calumet marsh. Some of the above are rare and seldom seen today. Add bald eagles and a flock of 500 sandhill cranes seen by Helen Lane, stilts, avocets, and the gull-billed tern of South America! But the original marsh boasted many a rare plant, too. In addition to all the common marsh plants, there was the rare *Thismia americana*, found nowhere else in North America, whose nearest relatives are in New Zealand. There were also certain disjunct species of sedges that belong to the Atlantic coastal marshes. These suggested some lost pieces in the history jigsaw of Chicago. Did the weight of the retreating glacial ice so depress the Great Lakes basin that an arm of the Atlantic Ocean reached here briefly?

Nature dies hard. The Calumet still lives and it is unlikely that a repeat of the lead poisoning episode could occur today with the Environmental Protection Agency around and with so much public attention. There is not much time and a great city that arose out of a quagmire should not erase its history and cut itself off from its past. Besides, it is entirely proper that the Earth's most powerful and successful species should assume some responsibility for the survival of other forms of life. **FM**

Virginia rail

DOAB July 31 to August 10, 1962

The First Days in the Field

by William S. Street *and* Janice K. Street
with Richard Sawyer

"I saw our quarry, all right—and could scarcely contain my excitement. It was a small herd of mouflon, or red sheep, of the sort that the Field Museum most wanted to collect."

It was about noon on July 31 when our caravan made its way out of the crowded thoroughfares of Tehran and into the countryside. Nicola Haroutounian, our driver-interpreter, was at the wheel of one of the Travelalls; Doug Lay drove the second; and Khosrow Sarari* led the procession in one of the Game Council's all-terrain vehicles.

"I can't believe that we're finally under way and on our own," Jan rejoiced. "It's as though a great weight has been lifted from our shoulders. Suddenly, I feel a great sense of freedom!" I had to agree.

We drove toward Chalus until about 5 o'clock, then turned off the main highway at Gach-i-Sar and drove to the Game Council's wardens' camp on the Varang Rud (river) where we were to spend the night. There, Khosrow introduced us to Abbas and Mammat,

**Khosrow Sarari was representative of the Game Council of Iran who acted as "chief of staff" for the expedition.*

"Doab, July 31 to August 10, 1962" is Chapter 4 of a forthcoming book, Before Khomeini; Adventure in Iran, 1962-63, *to be published by Field Museum.*

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William S. Street, now retired, was formerly president of Frederick & Nelson (Seattle, Washington), a division of Marshall Field & Co. of Chicago. He was also executive vice president of Marshall Field & Co., general manager of the Chicago stores for three years, and a director of the parent company. Together with his wife, Janice, William Street organized and led five field expeditions for the Field Museum: two to Iran (1962-63 and 1968), one to Afghanistan (1965), one to Peru (1975-76), and one to Australia (1976-77). Mr. and Mrs. Street are members of the Field Museum's Founders' Council.

The 1962-63 Iran expedition, recounted in Street's forthcoming book, *Before Khomeini*, succeeded in collecting nearly 3,500 specimens of mammals, several hundred specimens of birds, reptiles, amphibians, fishes, and literally thousands of specimens of parasitic arthropods. The Field Museum now houses one of the finest collections of these groups in existence anywhere. The Streets were accompanied by Douglas Lay, then a doctoral candidate in zoology and now on the faculty of the University of North Carolina.

The very word "expedition" generates a sense of excitement, of far places, of disappointments and triumphs, of tiredness and exaltation, of temporary misery and discomfort followed by the simple luxuries of a hot bath, comfortable bed, and a meal cooked by somebody else. Above all, an "expedition" thrusts you into a world different from your own — with people of other cultures, upon whom you are dependent for cooperation and, at times, survival.

All these emotions and experiences, and more, are part of the tapestry woven by Bill and Jan Street in their account of their own scientific expedition to Iran in 1962-1963. Their love of the outdoors and their previous experiences in the Pacific Northwest, Alaska, Kenya, and Tanzania had prepared them in part for the Iran Expedition.

Staff at Field Museum, Curator of Mammals J. C. Moore, Chief Curator of Zoology Austin L. Rand, and Director Clifford C. Gregg, gave focus and direction to the Iranian field collection trip. As plans developed, the Streets decided to support a graduate student as expedition scientist, to participate themselves in the field work, and then to support the student to work at Field Museum for several months after the expedition was over. Not only was the student to help prepare the specimens for detailed study but also to use at least part of the expedition material in a Ph.D. thesis project.

It was a fortuitous meeting of lay and experienced people through a great institution — Bill and Jan Street with their interest in the world of nature, experience in organizing and directing, eagerness to expand their horizons at a time of life when many of us look towards the rocking chair; and—Field Museum with its staff who search the world on behalf of science. Field Museum is a major research institution committed to the study of evolutionary biology and ecology.

We hope that Bill and Jan have set a precedent for others to follow. The science of mammalogy has benefitted greatly from their efforts, the collections of Field Museum have grown significantly, and a generation of young scientists have been helped by the Streets' farsightedness.

—Willard L. Boyd

two game wardens who would accompany us into the mountains. The men at the camp insisted on treating us deferentially, moving out of their tent so that Jan and I could use it for the night. We protested that we could easily set up our own tent and were quite prepared to do so, but to no avail. To avoid seeming ungracious, we accepted their hospitality.

The altitude of the camp was about 6,000 feet, and it was a relief to have gained so much elevation while still driving our vehicles. We knew that we had another 4,000 to 5,000 feet to climb to the high valley, and for this last assault on the summit, we would depend on pack and riding animals. We slept only fitfully that night, alternating between sound sleep and full wakefulness, wondering what we had forgotten and trying to anticipate what the morrow held for us.

The next morning we wakened early and crawled out of our sleeping bags. Not long after, three villagers —Ezat, another Mammat, and Chabon—walked into camp with the pack animals. They brought with them sixteen mules and three horses. And the horses, praise be, were fitted with saddles!

Two of our skilled hunters —Mammat 2 and Ezat.

On to the High Elburz Mountains

We began to load the pack animals almost immediately and were amazed at how much those sturdy little mountain mules were expected to carry. It was not at all unusual for an animal to be laden with 200 pounds of equipment—then, when the march got under way, for one of the men to climb atop the load. All of our gear was loaded on fifteen of the animals, leaving the three horses and one mule as transportation for members of our party.

Doug Lay and Khosrow Sariri seemed to have the loading procedure for the pack animals well in hand, so Jan and I went ahead, walking up the trail alone. We left camp at 6:00 A.M. and Doug soon caught up with us. We all shared a sense of great excitement, and we delighted in the rocky, mountainous terrain. Everything was new and each unfamiliar bird we spotted and every scurrying lizard captured our full attention. After about two hours, the pack animals caught up with us.

We walked through one tiny village tucked snugly into the hillside. The flat-roofed houses were built of stone and clay. Few of the houses had windows, and the doorways served both as passageways for people and as openings for light and fresh air. Dried cow dung, like the buffalo chips of our own western history, was neatly stacked to a height of about four feet on every roof. The villagers stored these chips (their reserve fuel supply) much as we would stack cordwood.

Houses were situated above and below the road we traversed, and we noted narrow walkways that led to houses on the lower level of the village. Like birds on a tree branch, little children and their mothers perched on the stone fences and rooftops to watch our procession make its way through the village. Our greetings of "Salaam" were met with formal bows and timid waves of the hand.

The land was green and fertile. Being in a river valley, the land was quite productive, greatly in contrast with the semi-arid wastes that we had driven through the previous day. Plots of diversified truck crops—potatoes, onions, tomatoes, cucumbers—interspersed with fields of hay and grain, made a patchwork pattern from the valley floor to midway up the slopes. We saw one man harvesting a small field of hay. Rather than cutting it close to the ground with a sickle or a scythe, he was

Dried cow dung, like the buffalo chips of our own western history, was neatly stacked on every roof.

Doug Lay and Janice Street survey the land from ancient fortification. Mt. Demavend (18,606 feet), Iran's highest, looms on horizon.

pulling up each clump by the roots so that none of the small crop was wasted.

After the pack train caught up with us, Jan and I alternately rode and walked, knowing that we would have to build up our wind and legs. When we walked, Nicola, Bahram, or one of the others would ride our horses. Doug, however, steadfastly refused to ride and walked the entire distance. Our enthusiastic young mammalogist was already scouring the countryside for game trails, burrows, and other signs of small animals.

As we gained the heights on the way into the mountains, we looked back to admire the patterns of rice fields (surprising at such an altitude) alternating with truck crops and grains. On the lower reaches of the terrain, great walnut and oak trees grew in profusion, all looking carefully pruned and tended. At the higher elevations (we were to camp at about 10,000 feet), we began running into scrub oak and heavy brush. Amidst the brush were some of the largest nettles I have ever seen—some taller than five feet. The wounds that such a plant could inflict would be crippling, and we gave them wide berth. Thornbush also grew rampant, but instead of allowing it to become an unpleasant nuisance, the farmers used it for fencing, thus avoiding the cost of conventional materials and utilizing a natural resource.

When we finally reached the long valley where we would establish our first camp, we paused long enough to survey our surroundings. On three sides were mountain ranges reaching another 3,000 or more feet above us. Two rivers, the Kharsang Rud and the Harde Rud, joined to form the Varang. We had been on the trail for nearly ten hours, and the time was four o'clock. We three Americans were thoroughly tired. The combination of the exertions of the climb, insufficient sleep the night before, and the altitude had taken their toll. Had the facilities been available, my mood called for a long, hot bath and a long, cool drink. The Iranians, however, looked as though they might have just returned from a stroll around the block. Indefatigable, they apparently could have gone on forever. Even the pack animals looked in good shape—they didn't even seem winded.

I had no more than given instructions about the placement of tents when Khosrow appeared.

"Still early, Mr. Street," he said. "Still plenty light. Why not take Abbas, Ezat, and Chabon and the horses and ride up into the valley to see if there are any mouflon—the wild sheep? The men will put up your camp."

William Street with one of 3,500 mammal specimens collected on the expedition.

I was either too tired or too taken aback by Khosrow's suggestion to protest. And within a half-hour, Ezat and Chabon (two splendidly bronzed and elegantly moustached villagers), Abbas, Khosrow, and I were heading into the hills.

The First Effort

With every bone in my body protesting, I remounted one of the sturdy little mountain ponies, and we set off to explore some of the high ridges beyond camp. Khosrow's hunting instincts were all in tune that day, because within an hour Abbas pointed excitedly up the face of one of the ridges. He spoke to me in Farsi, which I did not understand, but the jabbing of his finger conveyed the message. Sheep!

I saw our quarry, all right—and could scarcely contain my excitement. It was a small herd of mouflon, or red sheep (*Ovis orientalis*), of the sort that the Field Museum and Yale University most wanted to collect. We urged our horses forward, and I was grateful for the strong hearts and lungs of those tough little animals. When we reached an altitude of about 11,500 feet, however, we had to tether the horses and go it on foot. The rock formations had become truly precipitous, and there were patches of shale to cross that would have left the horses helpless. On the shale, it seemed that I was going back one step for every two forward.

I had thought I was in pretty good shape, but the exertions of that first afternoon's hunt nearly got the better of me. Hot red spots pulsed behind my eyes, my legs trembled, and I fought for every breath. At one point, Ezat took my rifle; then he relieved me of my camera—which at the moment I would have gladly chucked into the abyss below. Several times when we were attempting to scramble up and across the shale inclines, Ezat reached out his hand to steady me when I faltered. I felt as if my participation in the expedition was about to end before it started.

After an eternity we reached the spot where Abbas was crouched, waiting for us. I crawled over, lay beside him, and looked in the direction he was pointing. There, about 150 yards distant—and up the slope—stood a splendid mouflon ram outlined against the sky. Abbas motioned me to shoot.

Ezat handed me my rifle, and as I settled into the sling I cursed the altitude and the laborious climb we had just completed. My arms trembled from oxygen starvation and my recent exertions, and the center-dot reticle on my 'scope was bouncing all over north-central Iran. I lowered the rifle to catch my breath, and prayed that my pulse would slow enough for me to get

off a shot. And, during that moment when I was trying to compose myself for the shot, the ram ambled off, out of sight.

I groaned inwardly at having missed a splendid opportunity and at the thought of losing face before the men. Just as I was cursing my luck, however, I looked up to see another fine ram silhouetted against the sky. The dot sight finally settled down and I squeezed off the round. How I dropped that sheep I'll never know, but with the shot, rams seemed to explode out of every crevice and from behind every rock. I fired again and missed, but Abbas managed to collect two of the hard-running animals before the herd disappeared from view.

At that moment my emotions were so confused that I had trouble sorting them out. My resources were so spent that I could have closed my eyes where I lay and slept the clock around. Yet I was elated that we had three fine mouflon specimens to ship back to the Museum—and at the same instant I was wondering just how we were going to pack those heavy carcasses down the mountainside and get them into camp undamaged.

When all the excitement was over, I glanced at my pocket altimeter. It registered 12,000 feet. No wonder my heart had stuttered like a telegraph key and my lungs had nearly burst. I was some 3,000 feet higher than either Jannie or I had ever been in either the Rockies or in Alaska. No wonder I was exhausted.

"Abbas," I said to the game warden, "I certainly hope that you and Ezat can climb up there and roll those three sheep down the slope. I'll try to help you back to camp with them, but right now, I couldn't climb another step. I'm all through!"

Of course, they couldn't understand the words I spoke, but they had no difficulty in interpreting their meaning. With sympathetic smiles and jaunty waves of their hands, they were on their way to the heights where our specimens lay. As I watched them scramble up the steep slope, I envied their endurance, agility, and climbing skill—all typical, I was to learn, of Elburz mountain men.

As they labored, I took stock of the terrain. It was dusk, and the view was fabulous. Sharp mountain ridges stretched on and on, one after another, outlined darkly against the sky seemingly without end. Our camp, which should have been set up by then, lay behind one of those ridges not too far distant. At the moment I could think of nothing more inviting than that camp, with its promise of a hot meal, my cot, and sleeping bag. This was one night when I was sure I wouldn't have to be rocked to sleep.

My reveries were interrupted by shouts and the sounds of rolling rock from above. Abbas and Ezat were pulling, rolling, and muscling our prizes down the mountain. And from below, one of the muleteers, Chabon, was leading the mules up the slope to be loaded. The sheep were packed aboard the mules in short order and we headed back toward camp. I climbed on my horse and let it pick its way down the faint trail over the rocks. When we arrived in camp about nine, only the faintest afterglow remained in the sky. I had a roaring headache from the altitude, was dead tired—and was hungry as a lumberjack.

As we sat down to supper that night, I felt certain that we would succeed in our quest. The expedition had begun on an optimistic note—we had collected three fine specimens and we had camp meat on hand.

Our after-dinner conversation was short that night. I just fell into bed and slept the sleep of the just.

Our Merry Company

To accommodate a group the size of ours, we had to establish a rather large compound. There were five tents: one large one in which Doug Lay did his work and kept all of the necessary scientific equipment; our own large tent for Jan and me; the cook tent; a tent shared by Nicola and Bahram, which also served as our community tent and dining room; and Khosrow Sariri's small private tent. Others who were temporarily with our party elected to sleep on cots in sheltered areas under the trees.

Before our ten-day stay at the camp at Resht-i-Elburz (or Doab) ended, we found that we were sometimes feeding as many as fourteen at meals. This did not include the drop-in trade we had from the occasional villager or shepherd who smelled the meat kebabs broiling on our fires. We were really pleased that none of the meat from the sheep and other large edible animals went to waste. It was a good arrangement: not only did we have our skeletal specimens for the museum, but also we fed ourselves and our neighbors handsomely.

Those who could have been considered more or less as permanent party were Khosrow Sariri, Abbas, and Mammat no. 1 from the Game Council of Iran; local muleteers, guides, and hunters Mammat no. 2, Yasdan, Chabon, and Ezat; our cook, Bahram; driver, Nicola; mammalogist Doug Lay; Jan and me. We had fielded quite a team.

One cold evening—it was 48° F. outside—most of our group were gathered in the big cook tent, drinking tea and trying to stay warm. To amuse ourselves, we decided to tape-record samples of the polyglot babble in which we communicated. The resulting tape bore conversational fragments dealing with the weather, planned hunts, the fresh vegetables and Iranian butter purchased that day from a nearby village, and Nicola's toothache—all expressed in a wonderfully intermingled gibberish of Farsi, English, Armenian, and

heaven-knows-what. It would have taken a battery of multilingual stenographers to sort out and transcribe the information.

Topography and the Lay of the Land

As I have noted, our first 10,900-foot campsite on the Karsang River was surrounded by much higher peaks. Iran is extremely mountainous. The Elburz stretch across most of the northern part of the country to meet the Kopet Dagh in the northeast. In the northwest, the Zagros Mountains (with peaks above 12,000 feet) run southeast from Mt. Ararat in Turkey to the Gulf of Oman. There was no dearth of mountain scenery.

In that first camp we had a breathtaking view of the Lars Valley far below, and for contrast, Mt. Demavend towering in the distance, its cloud-piercing peak reaching 18,606 feet. Mountain slopes splashed with turquoise, brown, and orange rock strata swept up to jagged ridges etched against the sky. This rugged beauty was softened by acres upon acres of alpine flowers such as Indian paint brush, forget-me-nots, sweet peas, buttercups, yellow daisies, violets, sweet mint, and others not known to us. We picked some of the blossoms and pressed them in a book. The flowers were intermingled with the wild grasses, clover, and *gevan*, a plant much used locally for fuel. Along our river valley the vegetation was lush and full.

We learned a few of the place names, and one day we ate our lunch at a place well known to hunters—Gsazekon-Chall, "the place of the hunters." The ridge of the Harsang mountain range that dominated the area had been dubbed "the Donkey" by local people, an allusion to something big and strong. One of the nearby valleys was known as Chalse-Chall, "the place of the birds."

One afternoon while our hunting party was away, Jan decided to explore the high rolling hill behind the camp. She left the compound a few minutes before five in the afternoon and scrambled up the jagged rock formation until she could look over the ridge, like the bear, to "see what she could see." She was treated to a magnificent view of mountains, crags, and distant valleys; but she also managed to attract the attention of three enormous sheep dogs that were on the far side of the draw. They immediately decided to investigate the strange creature that had invaded their territory, charging down into the ravine and scrambling up toward

William and Janice Street and Doug Lay with freshly caught specimens.

where Jan was perched. She froze and outwaited them. The dogs, apparently discouraged by the steepness of the ascent, turned back. Jan, instead of taking the gradual slope back to camp, decided to seek the quickest way out of there, so hunkered down and descended ingloriously. She trudged back into camp about eight o'clock only moments before our hunting party arrived. She had seen some glorious terrain and had learned a valuable lesson about the protectiveness of Iranian sheep dogs.

We remained in that first camp at Doab from August 1 until August 12. We became rather well acquainted with the place, and Doug Lay, our mammalogist and chief specimen preparator and botanist, made detailed observations. He noted that several plant communities existed in the 3,320- to 4,000-meter elevation immediately surrounding our campsite. There was a streambed community of plants; carpets of grass kept short by constant grazing and cropping by the sheep; and a community of taller plants that included the great nettles, *Canna, Campanula, Cousinia, Ligularia, Tragopogon,* and *Bromus.* A number of springs fed into the river valley, and around the springs we found thick mosses and delicate plants such as *Polygonum,* well adapted to wet soil. The runs and burrows of small rodents abounded.

Higher up the slopes where the ground began to become rocky and arid, the lush river-bottom plants gave way to thistle, *Salvia, Thymus,* and *Stragulus,* and to plants of a quite different nature. From the river bottom to rocks to clay and shale—each had plant communities suited to the soil—everywhere was evidence of small-animal traffic. Above the 3,650-meter elevation, the situation became quite complex because of the clay soil, rock-strewn cirques, and bare rocky outcroppings. Jan discovered a typical alpine community of plants among the scattered snowfields at approximately 4,000 meters—13,120 feet!

The Shepherds and the Villagers

The great flocks of sheep and goats fascinated us endlessly. Both sheep and goats seemed to come in every imaginable shade of black, brown, gray, and white and in every combination of these basic colors. Herds of several hundred sheep and goats were by no means unusual. The herdsmen had an unusual custom of adorning some of their favorite animals with strings of blue beads, and the first time we saw such an animal all decked out as if to go to a party, we didn't know what to make of it. The sight was really quite fetching. Some scholars say that the blue beads are charms to ward off evil.

The shepherds did not have an easy time of it. We learned that they earned only about 6,000 *rials* a month (approximately $90) at work that kept them from their homes and families all summer long. And there were constraints on them that would not have occurred to us. If an animal was killed in an accident, or fell ill and died, the shepherds had to send the head and the meat down the mountain to the owner of the flock to avoid suspicion of unlawfully killing the animal for their own use.

How Things Change

Do you hold the same opinions today that you held 10 years ago? Do you have greater income now than when you first started work? As a result, are you more secure financially, or in other ways?

Times change, and, in many ways, most of us change, too. Shouldn't your will reflect the changes in your life, which can affect your loved ones and allow you to provide better for them?

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Best time to call: (day) _____ (hour) _____

Shepherd making goat cheese.

Two shepherds could handle an immense number of animals. One in front of the flock and one behind, helped by their great dogs, they kept the animals in control. Like many of the farmers, muleteers, and other workers on the land, the shepherds seemed to have no affinity for soap and water—they were an earthy bunch. One of them, suffering from some sort of stomach discomfort, came into our camp one night. He seemed to know that we would have medicines of one kind or another, and we obliged as best we could. We gave him a bit of sulfa and some green APC tablets that were expressly for stomach distress and sent him on his way, hoping that we had done him no harm.

Food was so plentiful for the herds that nowhere had the sheep and goats been allowed to remain in one area long enough to damage the grasses by short cropping. The shepherds kept the flocks moving, ensuring that the grasses could come back for another season of grazing.

Not far from our camp at Doab, three shepherding families lived in homes that were little more than dugouts in the steep hillside. We estimated that these three families cared for about 3,500 sheep and goats, many of the goats having to be regularly milked. At one of these stone-and-mud dwellings, we saw how the milking was done.

We were invited into this home, stepping down a short flight of stairs into a large unpartitioned room with a fireplace at one end. Near the fireplace was a supply of the thornbush that was used as fuel. Next to the fireplace was a stone bench on which four men were seated, each with a copper cauldron on the floor between his feet—and each was milking a goat. Goats are milked from the back, and when the milkers had extracted the small yield of milk—perhaps a cup from each nanny—the goat would be pushed away and another would take its place. The milker would seize the fresh goat by the hind legs, position its udder over the copper vessel, and begin the milking—a task that took only three or four minutes for each animal. The goats were apparently accustomed to the ritual, because they entered the room almost as if on cue, then departed just as promptly through a small opening in the wall of the building.

The shepherds (and our cook, Bahram) made a kind of yogurt from the goats' milk, and once one of the shepherds came into camp with a large pail of this typical Eastern food. He presented the yogurt to us and we thanked him profusely. We ate it willingly enough but found that unpasteurized, raw goatmilk yogurt is a bit wild for the Western palate unless doctored up a bit with seasonings or used with other ingredients in cooking.

We were visited often by the villagers and the shepherds. Fresh meat and curiosity were the main attractions, I am sure. When we had taken one or more of the large game animals, such as the mouflon, charcoal fires were kept kebabing all day long. We made everyone welcome, and not one scrap of meat removed from the skeletons of our larger specimens was wasted. We found ourselves conducting what amounted to a marathon public barbecue.

During our stay at Camp Doab, we saw only one small herd of cattle. Surprisingly, we also came across a herd of twenty camels, serenely grazing at an altitude of nearly 13,000 feet. The camels, we assumed, were used for transportation during the necessary periodic trips up and down the mountain between the village and the flocks. The shepherds made butter and cheese from much of the milk produced by their herds, and it was occasionally necessary for them to take the surplus butter and cheese down the mountain to storage cellars in their camps. Their churns, primitive but effective, were contrived from hollowed-out logs with plungers fitted into the top openings.

The shepherds and villagers visited us almost daily, and we could never get over how easily the Iranian mountain people negotiated the steep slopes. Iranians are great walkers, and when they were born in the mountains, amazing endurance was part of their

adaptation to their environment. It astounded us when villagers who had walked all day up the mountain just to visit us, strolled into our camp seemingly fresh and unwinded. They had just climbed a steep mountainside as though it were the village green! From their unperturbed appearance, they might as well have been out for a stroll in the park.

Camp Life

As I have mentioned, we pitched our camp at the 10,900-foot level on a small flat area near the Varang Rud. It was reasonably dry at our campsite, although the ground was sometimes damp from rain showers. Indeed, the weather kept us entertained with its variety. We had warm days and cool nights, and in the twelve days of our stay we experienced rain, hail, thunder, and lightning. There are few experiences more likely to convince one of one's insignificance and perishable nature than to be in the midst of a great weather system that produces a high-altitude electrical storm. Brrr!

But our experiences in that first camp were great conditioners. We were regularly getting the kind of exercise we needed and were pleased to note that we toughened up within the first few days. The weather was cool, the water good, and for the most part, we felt well and happy. About the only recurring health problem was a dysentery-like ailment that plagued one or the other of our party off and on during a great part of our first two months in Iran. It usually responded to medications that we carried with us. To reduce the incidence of this kind of malady, we always boiled our drinking and cooking water or treated suspect water with Halazone tablets.

Right from the start we were careful to maintain a clean and sanitary campsite. At Doab, and at every other location where we made camp, the first order of business was the digging of two pits—one for our "Chic Sale," the other for the burial of all camp garbage and trash. Around the Chic Sale we erected a privacy screen by draping burlap around saplings or tall stakes driven into the ground. We also rigged a red-bandana semaphore signal—up if in use, down if vacant.

If an army marches on its stomach, so does any field expedition. Our cook Bahram may have been an incipient tyrant, but he was undisputed maestro of the cook tent. He was resourceful, inventive, and skilled in his craft. We would have been in a sorry plight without him.

We had purchased several small one-burner Swedish kerosene stoves. Even in the most remote villages, kerosene could be found because of its general use throughout Iran for cooking and lighting. Then too, Bahram had had more experience with the small kerosene stoves and felt more at home working on them than on the complicated gasoline stoves that we might have chosen.

Some of the staples in our diet were established early on by our cook. He had insisted that we bring a hundred pounds of lavashe with us on this first leg of our journey. Lavashe is a paper-thin, crisp, unleavened bread that is more like a wafer than anything else and made from only flour, water, and salt. We quickly became rice eaters, because it was served at every meal. And the amount of oil Bahram used in his cooking amazed us, but we quickly learned that in the Mid- and Near-East, oil is considered to be a part of the dish rather than just a necessary accessory to its preparation.

The first night in camp at Doab we were introduced to one of Bahram's rice dishes. He cooked his rice in the usual manner and then placed quite a bit of oil into another pan. Into this he broke fifteen to eighteen eggs and dolloped some tomato paste over them. Without scrambling the eggs, he cooked the mixture (he called it "poaching") just until the whole eggs reached a certain degree of doneness. He placed the cooked eggs (which he called an omelet) in a serving bowl and suggested that we pour some of the egg toma-

Young Iranian demonstrates most practical way to hold hedgehog.

to paste mixture over our rice. Unusual as it sounds, it was flavorful and satisfying.

Not all of Bahram's experiments were received with such acclaim, however. I remember one concoction he put together that Jan could not force down. Diplomatically, she waited until the cook's attention was diverted, then deftly slipped the offending portion under a nearby rock.

Our breakfast fare quickly became routine. It had to be something easy to prepare; nourishing, but not too heavy; and appealing to the palate. We settled on lavashe, cheese, jam, tea or instant coffee, and a glass of Tang. This got us off to a good start, yet didn't take hours to prepare or load our systems down with heavy food, hard to digest while on the move.

We Begin to Take Specimens

The taking of the three mouflon rams on our first night in camp had got us off to a good start. It was exhilarating to know that we could function and shoot straight at an altitude of 12,400 feet and that collecting was possible at such elevations. We were plunged into the reality of collecting, preparing, and preserving biological specimens within hours of our arrival.

Each day, we hunted—the weather permitting. Jan went with one group and I with another. Jan usually hunted with Abbas and Ezat, while I was most often in the company of Khosrow Sariri and Mammats 1 and 2.

On our second day, August 2, 1962, Khosrow left camp early with Abbas and one of the villagers to see what game herds they could find. That afternoon Nicola and I accompanied Doug Lay into the higher areas where we set out nearly a hundred small animal traps. Specially designed Field Museum snap traps, rat-size snap traps, mole traps, various sizes of steel traps, and Sherman live traps were routinely used. Khosrow and Abbas returned to camp at about 8:30 P.M., having collected one mouflon ewe. We needed at least one more ewe and a couple of lambs to complete our mouflon group.

On the morning of August 3, we left camp at about eight o'clock on horseback and started up the river for the higher country where we might again encounter mouflon. Jan and her party finally reached an altitude of 13,300 feet, and we were at a similar height—the highest either of us had ever been on foot. We were earnestly looking for ewes and lambs on this hunt but were unable to get close enough for a shot. Khosrow finally shot another fine ram, and we settled for that. We managed to get the sheep loaded on one of our pack mules and dropped down to about 13,000 feet for a breather.

Ezat took a blanket from one of the horses, the men built a fire to heat water for tea, and we sprawled gratefully to rest and wait for refreshment. After all our exertion and the effects of the altitude, an hour's rest and a repast of cold mutton, cheese, cantaloupe, and scalding tea was as welcome as a banquet at Maxim's.

After an hour or so, we again formed separate parties to return to camp. When we arrived, we all found that it had been less terrifying riding *up* a steep incline on horseback than it was coming *down*. Gazing down from those dizzying heights from atop a none-too-sure-footed horse was enough to give anyone pause. The

Camp consisted of five tents. Temporary party members slept in sheltered areas under the trees.

"Both sheep and goats seemed to come in every imaginable shade of black, brown, gray, and white and in every combination of these basic colors."

jagged rocks thousands of feet below looked particularly threatening, especially just as a mount made a misstep or stumbled. At some point everyone who had been riding horseback dismounted and led their animals down the mountain.

We were all back in camp by six o'clock, tired, hungry, and immensely pleased with our success.

That evening Khosrow said to us, "If we want to get the mouflon ewes and lambs, and the ibex, we must leave camp early in the morning—say at five. The sheep and the goats are early risers and are out feeding even before daylight. In the heat of the day they are smart—they bed down and are not often seen in numbers."

"If that's what we have to do," I told him, "we'll do it." Then, wondering if my aching muscles and bruised old bones could be made to live up to my brave words, I announced, "Somebody be sure to wake me in time."

There must have been a sympathetic deity somewhere in the Iranian heavens, because the wind blew all night long, and when Jan woke me on the morning of the fourth, fog hung heavily over our mountains and not another soul was stirring. The visibility was so poor that the launching of any kind of hunting party would have been foolhardy. It was almost with relief that I crawled back into my still-warm sleeping bag and pounded my ear until late that morning.

That afternoon after the fog lifted, we tried again, but the game eluded us.

On August 5 we hunted again, with no luck at all.

The expedition collected hundreds of bird specimens as well as mammals, fish, reptiles, amphibians, and arthropods. Doug Lay holds small owl.

The weather was cold and rainy. On this day, Jan and I found ourselves on the way to the highest point seen from the valley—some 14,300 feet. I suggested that we keep going to see if we could make it. Just as we started a sloping walk of about 100 yards to the highest point, we were diverted by the sounds of shots coming from below. We turned around and retraced our steps in order to be in a position to intercept any sheep driven our way. But nothing. We had to be satisfied with having climbed to an altitude of 14,000 feet—an all-time record for us both.

After our return to camp, we all gathered in the cook tent to drink tea and get warm. The weather outside was a soggy 48°F, and we were trying to be optimistic and develop a game plan for the following day.

On the morning of August 6, we launched a real campaign to complete our collection of mouflon and to find the ibex necessary for the Museum's needs. We left camp in two parties at 6:30. One went downriver in search of mouflon and ibex and my party went upriver along the now-familiar trail. Speaking only half in jest, we all vowed not to return to camp empty handed. Our time at Doab was getting short, and we had not collected the number of large animals required.

Junior collectors

On this day Jan remained in camp. The hunt was to be a highly concentrated effort and the going would be difficult and dangerous. Before that day was over, most of us would have gladly changed places with her, because the Iranian weather threw the book at us. It was cold and windy, and at one time or another we were treated to rain, hail, thunder, lightning, and high winds. Snow fell in the higher elevations.

Our group struggled into camp at about seven that evening, and I was pleased to say that we had been able to collect two really superior mouflon rams. We were so high in the mountains (13,300 feet) that I assumed we were seeking ibex, but it was the ram mouflon we found at this elevation, and we managed to bag the two.

True to his word, Abbas and his group of downriver hunters did not return to camp empty handed. They didn't return to camp at all that night! But about eleven o'clock the following morning, August 7, he and his men came into camp with two mouflon ewes and two young of the same species. The mouflon group had been completed. As soon as we could collect representative ibex specimens, we would be able to break camp and leave the high altitudes for the lower-elevation habitat of the forest.

Another game warden, Isa, proclaimed by Khosrow Sariri to be the most accomplished warden in all of Iran, came into our camp on the seventh. He was younger than Abbas, vigorous and full of energy. I had no doubt that he would lead us a merry chase when we arrived in the area of his specialty, the forested regions where we would next concentrate our activities.

So far in this narrative, I have dwelt disproportionately on the pursuit and taking of large game animals. There is no doubt that they were more challenging to locate and more exciting to collect than the smaller mammals; but from a scientific point of view—the focus we dared not lose sight of—the tiny animals were every bit as important as the larger, more dramatic fauna.

Douglas Lay had been very busy. At Doab he set, relocated, and reset hundreds of traps. Although he did not collect as many specimens as he had hoped from this location, the discoveries he made were important for the scientific community.

For example, in the clay-slope community of ground-dwellers above our camp, little *Microtus nivalis*, the snow vole, was found in abundance. Doug was the first zoologist to discover this animal in this particular habitat. Also in this same clay-slope community were *Microtus arvalis*, the common vole; *Apodemus sylvaticus*, the common field mouse; and *Cricetulus migratorius*, the gray hamster.

Skinning, measuring, and stuffing small rodents were essential expedition chores that Doug Lay (shown here) taught the Streets.

Discovering the snow vole in a new habitat was especially exciting for Doug, and for that matter, for all of us. One of the principal aims of our field work was to determine the range and habitat of animals known or suspected to be in Iran. To find one of our target animals in a hitherto unknown habitat at our first campsite made us feel that our expedition was off to a promising start.

On Doug's first full day of collecting, he brought in ten animals; two snow voles; two *Apodemus;* one gray hamster, and five *Microtus.* The second day yielded only two common voles and four *Apodemus.* Almost every day we were in camp, Doug set out his traps in different localities, wherever there was promise of colonies of small mammals. On August 7, Doug and Nicola, our driver, set out with a hundred traps. It was Doug's first long trip out of camp, and the two men climbed to an altitude of 12,500 feet, setting out traps all along their route. According to Doug, it was wonderful country for trapping.

Rigors of the Hunt

Old Mother Nature is the world's greatest leveler of people. In the out-of-doors, all are subjected to the same elements, dangers, vexations, and frustrations. Station in life is of absolutely no importance: the only things that matter are strength, savvy, and the breaks of the game.

One afternoon at the 12,000-foot level on a mountainside in Iran, I thought of the last board-of-directors' meeting I had attended before leaving the United States. A picture of the walnut-paneled board room, deeply carpeted and appointed with elegant flair, flashed before my eyes. I thought of well-dressed men, talking earnestly of serious matters in sober surroundings.

At the moment these thoughts came to me, I was on my hands and knees, cursing and covered with dust, having just pounced at—and missed—a fleet-footed little mouse about two inches long!

"Missed the little bastard!" I shouted.

"There he goes!" shouted one of the game wardens to the other. "He's coming your way! Get heem!"

A voluble burst of Farsi exploded out of a cloud of dust as the second game warden scrambled after the evasive rodent. Then in English, the cry: "Got 'eem!"

Ah! What people will do in the name of science!

We Prepare Specimens

I believe that it was on the second day in camp at Doab when Jan and I began thinking like zoologists. As the specimens began coming into camp, we could see that Doug Lay was going to be swamped. There was just no way he could handle his trapping and recording and do all the specimen preparation as well. He needed help—immediately. If the specimens could not be properly recorded, prepared, and preserved, there would be no point to the expedition. It was as straightforward as that.

Right then and there, Doug sat down with Jan and I and taught us how to skin, measure, and stuff small rodents with cotton. And from that time forward, Jan and I had all the work we could handle, helping in the preparation of the unceasing influx of specimen material.

Jan wrote in her journal:

"My children would never believe it if they could see me skinning mice. I am very adept now. I don't hurt the eyes and I can get the ears out and can even get the lower fangs that you never would know a mouse had until you got into this skinning process. I don't like stuffing, though; getting them stuffed with cotton in the right shape is hard. You have to put wires in their legs and a wire in the tail wrapped with cotton, and it is quite a job. I don't mind sewing them up, but I would rather skin than stuff them.

The first two mice I worked on provided me with quite an adventure. One skull ended up minus a tooth, but the other skull was perfect! But as I stuffed the second one (the one about which I was so pleased), I managed to cut his tail off, so had to sew that back on.

Our first ten days in the field had provided us with the shake-down cruise that we needed. Even in that short time, our bodies had slimmed down and toughened, our wind had improved, and we had established that we could take the rigors of hunting and functioning at high altitude. We learned how to handle the specimens from the point of collection to their shipment to the Museum. We learned what to expect from our equipment, the natives of the countryside, and more importantly, from ourselves.

It was a good start. FM

TOURS FOR MEMBERS

The Precolumbian observatory at Chichen Itza, Yucatan

Yucatan Discovery Cruise

January 10-26, 1986

A team of specialists will take you through the incredible ruins of the Yucatan, built by the highly cultured Mayan peoples between the 3rd and 13th centuries A.D. Cruising aboard the Greek-staffed *Stella Solaris,* we will visit Playa Del Carmen, Uxmal, Tulum, the famed ceremonial city of Chichen Itza, and the newly excavated Coba. There will be plenty of swimming, snorkeling, and sunbathing in Xel-Ha, Akumal Beach, and Cozumel. In addition, we will visit the modern resort of Cancun, the island of Grand Cayman and Montego Bay. Dr. William Burger, chairman of Field Museum's Department of Botany, will be tour leader.

Egypt

January 29-February 15, 1986

Explore Egypt, the land of ancient mysteries. Journey from bustling Cairo, with its renowned Egyptian Museum, its mosques, minarets, and markets, into the ghostly silence of ruined cities, splendrous temples, and noble tombs. The 5,000-year-old Step Pyramid, the massive stone ruins of Karnak, and the Colossi of Memnon all beckon the curious and inspire respect for a culture as old as Western civilization itself. As you cruise the Nile, observe age-old scenes along the shore, for life in the fertile Nile Valley has changed but little. We encourage early enrollment, since spaces fill quickly for this breathtaking journey into the past.

Baja California

March 8-23, 1986

Less than 50 miles south of the U.S.-Mexico border begins a peaceful world of subtropical beauty—the Sea of Cortez (Gulf of California). Over 600 miles long, this gulf is a paradise for marine vertebrate and invertebrate life—and for those of us who enjoy its study. Field Museum members will have the opportunity to know this sea of wonders in a voyage that will all but complete the circumnavigation of the peninsula of Baja California.

Until 1973 road travel in Baja California required rugged vehicles and rugged souls. Even now less than 5 percent of the coast is accessible by road. And although for decades fishermen and scientists have found the region a treasure house of riches, it has escaped popular attention. In the 1970s world interest in whales grew. At the same time there was a dramatic increase in the numbers of California gray whales, and today each year from December through April, 15,000 gray whales visit Baja's Pacific lagoons to breed, give birth, and nurture their young.

It was our desire to organize a Field Museum tour to this area. All that was needed was a small, maneuverable, comfortable ship. We found it—the *Pacific Northwest Explorer*—and in January 1981 our first Field Museum circumnavigation from San Felipe to San Diego began. There were pelicans and hummingbirds, strange endemic plants, lovely scenery, and whales and dolphins beyond expectation. During this and the next two voyages we encountered not only many gray whales, but also fin, humpback, sei, and, the largest of all—blue whales. At San Benitos we walked among huge "hauled out" colonies of northern elephant seals. And we saw more than 130 different birds and 120 fish species.

Now is your chance to experience the solemnity and the life, the aridness and the wealth, the starkness and the beauty that is Baja California. Now is your chance to join Field Museum's 1986 tour to Baja California, to be led by Dr. Robert K. Johnson, curator of Fishes at Field Museum. Dr. Johnson is a highly experienced tour leader. This will be his fourth trip around Baja California. Special Expeditions, a division of Lindblad Travel, operators of the ship to be used, will provide several additional naturalists whose expertise will further enrich our experience. Our home for the voyage is the one-class, fully air-conditioned 143.5-foot MV

TOURS FOR MEMBERS

Pacific Northwest Explorer, built in 1980. Early expression of interest and reservations are advisable.
Land and cruise arrangements per person:

Lower deck double cabin	$3,250
Upper deck (U201-215)	$3,950
Main deck	$4,090
Upper & bridge deck name cabins	$4,280
Lower deck single cabins	$4,890

(Air transportation to and from San Diego not included in above prices)

The Art and Culture of Indonesia— A Voyage to the Islands of the Java Sea

March 21-April 8, 1986

Composed of thousands of islands forming a vast archipelago, Indonesia is an ancient land of gentle peoples, rich and varied cultural traditions, and tropical landscapes of unsurpassed beauty. With its panoply of religions, art forms, rituals, and dances found nowhere else in the world, Indonesia confronts the visitor with a fascinating past; its history, myth, and legend are often inseparable. On an itinerary which has been carefully planned to include well-known sites as well as remote, verdant isles, we will travel aboard the ship *Illiria* to destinations of immense beauty.

China's Great Wall Stanton Cook, courtesy the *Chicago Tribune*

The Great Silk Route of China

May 21-June 15, 1986

Field Museum is offering an exciting new itinerary for The People's Republic of China, featuring some new areas of interest to the world traveller and to those who have visited China previously. Our flight from Chicago is direct to Tokyo then on to Beijing. After several days there, viewing such marvels as the Forbidden City and the 98-acre Tien An Men Square, we go on to Urumqi, Dunhuang, Lanzhou, Xian, Shanghai, and Guilin. Xian is of particular interest to archaeology buffs for here we find the vast life-size terra cotta army discovered as recently as 1974. We return to the U.S. via Hong Kong.

Alaska

July 2-16, 1986
$4,885

Visit Alaska in summer! Explore magnificent waterways and vast parklands abundant with many species of birds. At Sitka, a marine wildlife rafting trip gets you started on this spectacular ornithological tour. From Juneau, a trip on the Mendenhall River offers unusual wetland viewing. From Anchorage one easily reaches Potter Marsh Bird Refuge and the Eagle River. Denali National Park (formerly called McKinley National Park) and the Glacier Bay cruise are special highlights. We conclude our trip with three days on St. George Island. Few people have visited this island, which boasts spectacular birding. Early enrollment is suggested. $50 will secure your reservation.

Grand Canyon Adventures

Field Museum Tours is offering two trips to the Grand Canyon in 1986. The first, August 13-22, is a geology study trip hiking down the north rim of the canyon, rafting for four days along the bottom and hiking back up the south rim. The second, August 22-31, is a rafting trip along the entire 300-mile length of the canyon by two motorized rubber rafts. Dr. Matthew H. Nitecki, curator of fossil invertebrates leads both. A deposit of $50 per person will hold your space.

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

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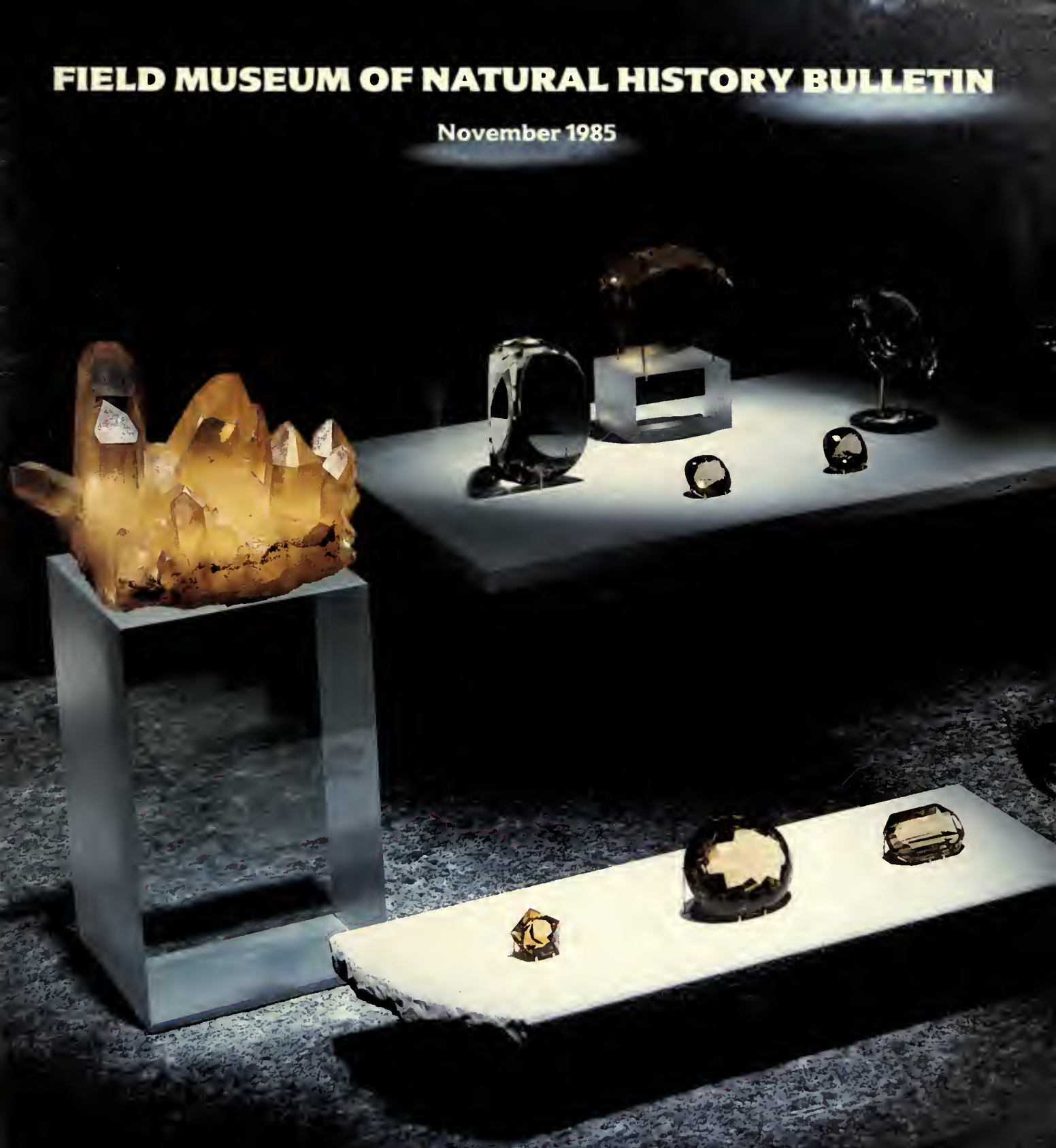
November 1985



New Gem Hall Opens

November 5

Members' Preview Nov. 3 & 4

Magical Circus from the Orient

November 23, 2:00pm & 8:00pm

Joan Embery: "Conserving the Wild"

December 7, 2:30pm

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View of citrine quartz display in Grainger Hall of Gems, opening November 5. Photo by Ron Testa and Sonia Fonseca.

Open Letter to Field Museum Members

Field Museum is fortunate indeed for the many thousands of Members who have continued to support it through the years. Thanks to these devoted friends, the institution has been able to vigorously pursue its primary goals of preserving, increasing, and disseminating knowledge of natural history.

Since 1979, the Museum has striven to keep membership fees at the same level. Rising costs, however, now make it necessary for the Museum to raise those fees. As of September 1, 1985, individual memberships will be offered at $30, family memberships at $35.

In appreciation for their loyal support, the Museum is offering current Members the opportunity to renew at the prior rate ($20 for individual, $25 for family memberships) through December 31. Memberships that expire after this date may be "prerenewed" at the old rate through December 31.

The benefits gained through Field Museum membership are numerous and lasting: from discounts on classes, tours, and purchases to the opportunity to discover—or rediscover—the exciting world of natural history. We cherish your continued interest and look forward to having you with us in the years to come.

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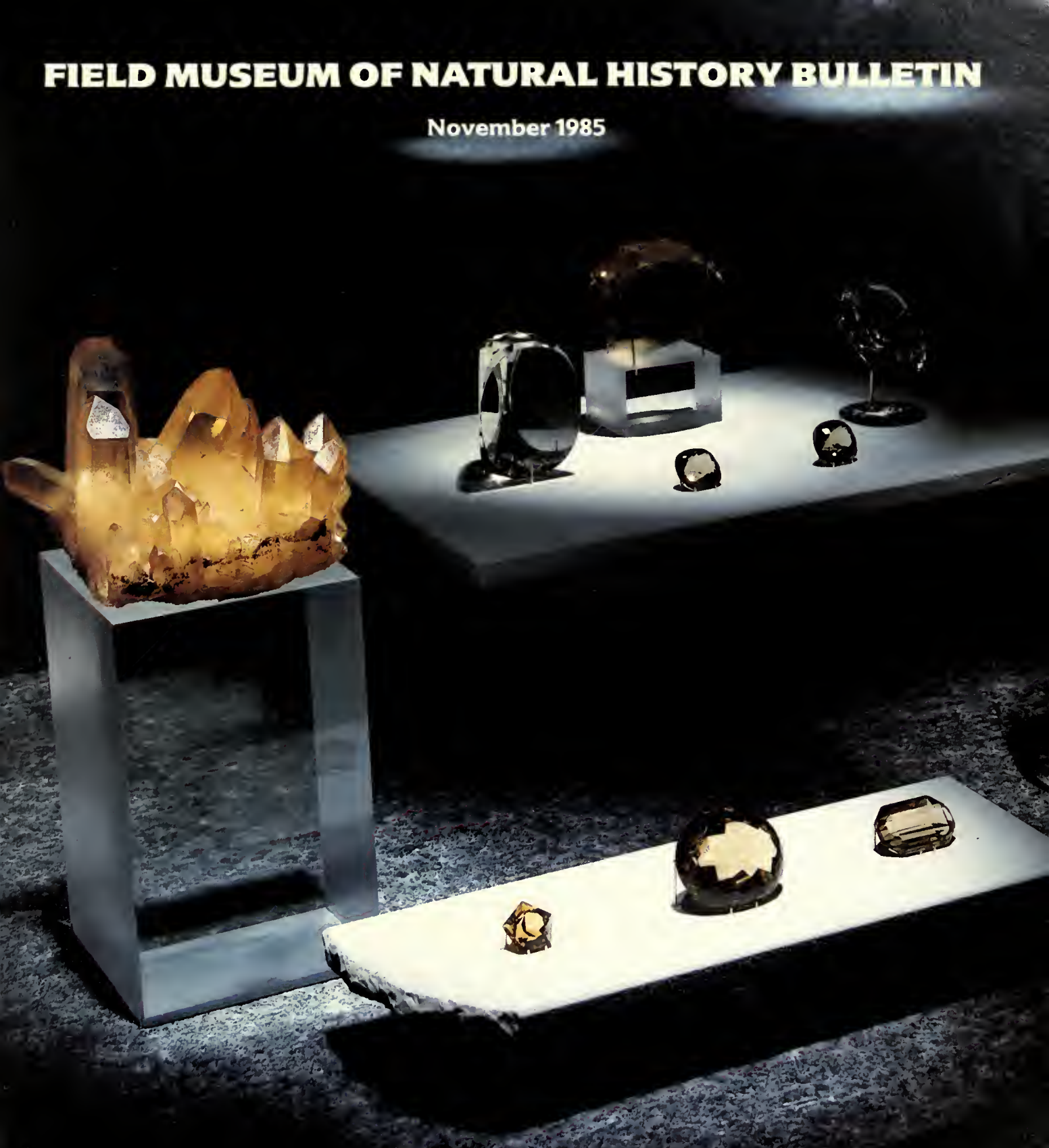

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View of citrine quartz display in Grainger Hall of Gems, opening November 5. Photo by Ron Testa and Sonia Fonseca.

Open Letter to Field Museum Members

Field Museum is fortunate indeed for the many thousands of Members who have continued to support it through the years. Thanks to these devoted friends, the institution has been able to vigorously pursue its primary goals of preserving, increasing, and disseminating knowledge of natural history.

Since 1979, the Museum has striven to keep membership fees at the same level. Rising costs, however, now make it necessary for the Museum to raise those fees. As of September 1, 1985, individual memberships will be offered at $30, family memberships at $35.

In appreciation for their loyal support, the Museum is offering current Members the opportunity to renew at the prior rate ($20 for individual, $25 for family memberships) through December 31. Memberships that expire after this date may be "prerenewed" at the old rate through December 31.

The benefits gained through Field Museum membership are numerous and lasting: from discounts on classes, tours, and purchases to the opportunity to discover—or rediscover—the exciting world of natural history. We cherish your continued interest and look forward to having you with us in the years to come.

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Events

Magical Circus from the Orient

Saturday, November 23
Performances at 2:00 pm and 8:00 pm
James Simpson Theatre

BURSTS OF FLAME, amazing magic, graceful dance, and total defiance of gravity are the trademarks of this Magical Circus from the Orient—the Chinese Magic Revue. Acrobats in the Orient have been perfecting their art for 2,000 years, and the Chinese Magic Revue is the pinnacle of that art. These astounding acrobats, dancers, and magicians begin training at the age of four. By fourteen years old, balancing in a 16-person human pyramid is virtually second nature.

Mind over matter is the only way to believe what you are seeing. Imagine an acrobat climbing a ladder with another performing acrobat upside down on the first acrobat's head. A sledgehammer smashing four bricks atop one troupe member's head demonstrates the amazing concentration used in the Chinese martial art, kung fu. Sword-swallowing reaches new heights, when a fluorescent tube is swallowed, turning the performer into a human torch. Combine all these incredible feats with the beauty and grace of Chinese, Korean, and Thai dance. Add to this the impossibility of Japanese magic and the ageless humor of the Chinese action opera, and the performance is complete.

Magical Circus Performers include:

- Chinese Acrobats featuring juggling cyclists, sword-swallowing, kung fu, balancing fantasies, and leaps through flaming, knife-lined hoops
- Korean Dancers performing the village chopstick dance
- Japanese Magicians featuring human levitation
- Thai Dancers performing intricate classical dance movements
- And the entire company featuring ribbon dancing, precision balancing, and a human pyramid

The Magical Circus from the Orient is an unforgettable and unbelievable treat for adults and children of all ages. Come one, come all to the most magical circus on earth.

Tickets: $10.00 (Members: $8.00).
Seating is general admission. Theatre doors open one hour prior to performance. Be sure to indicate performance time preferred when ordering tickets.

CONTINUED →

Family Feature

A Gem of an Event
Saturday and Sunday, November 16 & 17
1:00-3:00pm

DIAMONDS, RUBIES, AND EMERALDS ARE YOURS—at least to see, in our new Gem Hall. Investigate the myths and realities of your birthstone and find it in the Gem Hall. Using baubles, bangles, and beads, design your own jeweled creation to take home. All materials are provided.

Family features are free with museum admission and tickets are not required.

A Trip up the Nile
A Festival of Egypt

Saturday, November 30
1:00-3:00pm

SAIL UP THE NILE to Ancient Egypt. Remember the glories of Tutankhamun in a special slide lecture on the exhibit "Treasures of Tutankhamun." Build a pyramid of your own, with hieroglyphs on the walls and hidden entryways. Films, tours of our Egyptian Hall, and other activities are featured throughout the day. Visit Ancient Egypt at Field Museum this Thanksgiving Holiday.

This feature is free with museum admission and tickets are not required.

November Weekend Programs

EACH SATURDAY AND SUNDAY you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. These programs are partially supported by a grant from the Illinois Arts Council.

November

2 1:00pm. *Ancient Egyptians* (tour). Examine ancient Egyptian artifacts from Predynastic times to Cleopatra.

9 1:30pm. *Himalayan Journey: Tibet Today and Bhutan* (slide lecture). Experience a Himalayan journey as you explore Tibet and Bhutan, "Land of the Thunder Dragon."

10 12:30pm. *The Brontosaurus Story* (tour). A fascinating look at some of the newest discoveries about the "thunder lizard" and other large dinosaurs.

17 12:00 noon. *Fireballs and Shooting Stars: Keys to the Universe* (tour). Explains the origins, types, sizes, and importance of meteorites.

1:00pm. *Red Land/Black Land* (tour). Examine the geography of the Nile Valley and its effect on the Egyptians who lived and ruled during 4,000 years of change in religion and culture.

24 1:00pm. *China through the Ages* (tour). Look at traditional China: its inventions, court life, and school of thought.

These programs are free with Museum admission and tickets are not required.

Registration

Be sure to complete all requested information on the ticket application. If your request is received less than one week before a program, tickets will be held in your name at the West Entrance box office. Please make checks payable to Field Museum. Tickets will be mailed upon receipt of check. Refunds will be made only if the program is sold out.

☐ Member ☐ Nonmember

American Express/Visa/MasterCard

Card Number

Signature Expiration Date

Return complete ticket application with a self-addressed stamped envelope to:

Field Museum of Natural History
Public Programs: Department of Education
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605-2497

Name

Address

City State Zip

Telephone: Daytime Evening

Programs	# Tickets Requested	Amount Enclosed
Magical Circus Nov. 23, 2:00 pm		
Magical Circus Nov. 23, 8:00 pm		
	Total	

Snake in the Grass Moving Theatre performs Dec. 14, 15

Animal Antics

December 1985

BRING YOUR FAMILY to Field Museum and join our celebration of the animal kingdom. Discover the habits and habitats of the creatures of the earth, sky, and sea during this month-long festival. Animals of fantasy and fact are featured in a multitude of performances, plays, craft activities, and demonstrations. These programs are free with museum admission. Tickets are not required.

Animal Antics is funded in part by the Illinois Arts Council.

Polar Confusion

A participatory play

Saturdays, December 7 and 14
12:30pm

LAST YEAR, YOU DELIGHTED at the antics of Karl and Katie Caribou and their friends in the arctic tundra. Join us this year for the continuing story of these zany creatures' arctic antics.

On their annual trek to the North Pole, Karl Caribou falls victim to misfortune and breaks his leg. Unable to keep up with the herd, he decides to fly ahead by plane. A singularly hilarious twist of fate determines that Karl's aircraft lands, not at the North, but at the South Pole. Follow Karl's tale as he meets new and very different friends and begins a lonely correspondence with his Northern pals.

Be prepared for lots of surprises, and plan on joining our colorful cast of characters. This program is free with museum admission. Tickets are not required.

Snake In the Grass Moving Theatre

Saturday and Sunday, December 14 and 15
2:00pm, Stanley Field Hall

JOIN FANTASY MAKERS EXTRAORDINAIRE, Koko and Garbanzo, in an exploration of myth and magic, mime, dance, masks, and a little technical wizardry.

Snake In the Grass relates the mythical themes of the Northwest Coast Indians using giant puppets, over-size masks, stilt-walking figures, and the familiar "trans-cultural" figure of the clown, fool, or trickster. Join the Raven, mischievous friend of the Old Ones, and his companion, a rather dolefully painted clown, as they reveal the fortunes and misfortunes of the Haida, Tsimshian, Kwakuitl, Bella Coola, Coast Salish, and Nootka.

This program is free with museum admission. Tickets are not required.

Carousel Animals

Carving Demonstration and Display

Saturday and Sunday, December 14 and 15
12:00 noon-2:00pm

RETURN TO THE WARM DAYS OF SUMMER and the fun of the amusement park merry-go-round. Pat and Patricia Tanner of Tanner Carousel display some of their hand carved and painted wooden carousel animals. Discover how these works of arts are produced, from the original animal sketches to the application of the paint and gold leaf. Make a hat resembling one of the spirited animals of the merry-go-round.

This program is free with museum admission. Tickets are not required.

CONTINUED →

"Conserving the Wild"

with Joan Embery, of the San Diego Zoo and San Diego Wild Animal Park

Saturday, December 7, 2:30pm
James Simpson Theatre

Our Zoos Are Playing a Major Role in the conservation of animals in the wild and saving endangered animals from extinction. The San Diego Zoo and the San Diego Wild Animal Park are dedicated to these endeavors. The San Diego Zoo is world famous for its animal diversity and extraordinary botanical collection. The Zoo's work in conserving animals in the wild, its successful breeding programs, and research in animal behavior, nutrition, and disease control are known throughout the field. The San Diego Wild Animal Park, an 1,800-acre breeding preserve founded in 1972, is devoted to preserving endangered exotic species.

Joan Embery, of the San Diego Zoo and frequent guest of "The Tonight Show" and "Good Morning America," joined the Zoo in 1968 while a pre-veterinary student at San Diego State University. In 1970 she was appointed to the position of official Zoo representative. She is also the author of three books about animals and her experiences at the Zoo: *My Wild World, Amazing Animal Facts,* and *On Horses*. Join Ms. Embery, and some local zoo residents, as she relates the fascinating story of this world famous zoo and animal preserve.

Tickets: $5.00 (Members: $3.00) Fees are nonrefundable.

This program is funded in part by the Ray A. Kroc Environmental Foundation.

Copyright ©1979 by the Zoological Society of San Diego

Joan Embery of the San Diego Zoo and San Diego Wild Animal Park, coming December 7.

Registration

Be sure to complete all requested information on the ticket application. If your ticket request is received less than one week before a program, tickets will be held in your name at the West Entrance box office. Please make checks payable to Field Museum. Tickets will be mailed upon receipt of check. Refunds will be made only if the program is sold out.

American Express/Visa/MasterCard

Card Number

Signature Expiration Date

☐ Member ☐ Nonmember

Name

Address

City State Zip

Telephone: Daytime Evening

Return completed ticket application with a self-addressed stamped envelope to:

Field Museum of Natural History
Public Programs: Department of Education
Roosevelt Road at Lake Shore Drive
Chicago, Illinois 60605-2497

Conserving the Wild

Member Tickets # Requested	Nonmember Tickets # Requested	Total Tickets Requested	Amount Enclosed

Family Feature

Animals on Parade

Sundays, December 15, 22, and 29
1:00-3:00pm
Stanley Field Hall

Animals in a circus,
Animals in a zoo,
Animals in a museum,
It's all up to you!

CELEBRATE ANIMAL ANTICS throughout December by adding your artistic touches to our Animal Murals. Paint something you have seen in the Museum halls, at the zoo, or only in your imagination. Help decorate Stanley Field Hall with a whole parade of animals.

This program is free with museum admission. Tickets are not required.

Talk to the Animals

Saturday and Sunday, December 21 and 22
3:00pm
Stanley Field Hall

WHEN WAS THE LAST TIME you looked a vulture in the eye? Why are a rabbit's eyes on the sides of its head and a monkey's in front? While they are looking at you from all sides, you can look back at some live animals and then study them in our exhibits. Observe the differences between the horn-bill bird from Bangladesh and a North American vulture, and learn how animal survival depends on these differences.

This program is free with museum admission. Tickets are not required.

The Touring Children's Theatre of the Second City

Thursday and Friday, December 26 and 27
2:00pm
Stanley Field Hall

FAMILIES HAVE BEEN JOINING in the fun with the Touring Children's Theatre of the Second City since 1965. Go with them on a Lion Hunt to deepest Africa, play in a Barnyard Symphony, and take a journey with Perry the Peacock. Directed by Eric Forsberg, The Children's Theatre of the Second City proves that fun and entertainment can break all age barriers.

Performances are free with museum admission and tickets are not required.

Everything Under the Rainbow

Saturday, Sunday, and Monday, December 28, 29, & 30
2:00pm
Stanley Field Hall

EXERCISE YOUR IMAGINATION with Child's Play Touring Theatre. Brought to life are creative writings from children of all ages. A second grader's poem becomes a song. A 10-year-old's space fantasy story turns into a wild audience participation play, complete with 8-foot rocket. A delicate fairy tale becomes a dance with soft music. Every piece is as unique as a child's imagination. Enjoy a collection of performances based upon works by children throughout the Chicago area. Come over and play with Child's Play Touring Theatre.

These performances are free with museum admission. Tickets are not required.

December Weekend Programs

EACH SATURDAY AND SUNDAY you are invited to explore the world of natural history at Field Museum. Free tours, demonstrations, and films related to ongoing exhibits at the Museum are designed for families and adults. Listed below are only a few of the numerous activities each weekend. Check the *Weekend Passport* upon arrival for the complete schedule and program locations. These programs are partially supported by a grant from the Illinois Arts Council.

December

1 1:00pm. *On the Wing* (tour). Explore the realm of flight and bird adaptations.

7 1:30pm. *Himalayan Journey: Tibet Today and Bhutan* (slide lecture). Experience a Himalayan journey as you explore Tibet and Bhutan, "Land of the Thunder Dragon."

14 10:30am. *Highlights of the Museum Collection* (tour). Travel through the halls and hear of lions in the wild, the secrets of mummies, Bushman the gorilla, and more of the wonders in the Field.

14 1:00pm. *Ancient Egyptians* (tour). Examine ancient Egyptian artifacts from Predynastic times to Cleopatra.

15 11:00am. *The Big Hunt Game* (tour). Track down the answers in this wild animal quiz, and win a prize.

These programs are free with Museum admission and tickets are not required.

A New Jewel in Field Museum's Crown

Grainger Hall of Gems Opens November 5

by David M. Walsten *and* Edward Olsen

The newest addition to Field Museum's expanding list of renovated halls is the Grainger Hall of Gems, opening to the public after two years of total updating —of the gem collection on exhibit as well as of the exhibit facility.

The new hall is a revolutionary departure from the one it succeeds; only the basic area—on the third floor to the west of the South Lounge—remains the same. Within the ageless splendor of the Museum's Greco-Roman facade, visitors to the Gem Hall will be awed and delighted by its contemporary freshness—a jewel in itself. The gemstones within represent but a fraction of the number on view in the old hall; but these have been chosen with painstaking consideration. Many appear to glow or sparkle with inner light, a tribute to skillful engineering: slender light beams from seemingly invisible sources reflect from jewel facets with laser-like intensity. Some gemstones rotate perpetually on miniature carousels. The entire effect is dazzling.

—And informative. The gems are in "family" groupings. Label copy for each group describes relationships between gem types. One section provides basic information: the most popular cuts of stones, cutting and polishing, heat treatment, fraudulent practices, factors influencing monetary worth, the distinction between *karat* and *carat*, and a great deal more. Another section deals with superstitions about gems and how they have been used in sorcery, witchcraft, and folk medicine. This educative aspect of the new hall (absent from its predecessor) is largely due to the great number of inquiries that the Geology Department has received from the public through the years. Most people, it has been realized, have little understanding of gems; yet, the subject is endlessly intriguing for all. Now, any visitor who pauses long enough to absorb the modest amount of label copy in Grainger Hall will come away with at least a basic knowledge of gemology; and such a visitor may put this knowledge to use in the future when considering gem purchases.

While the old exhibit, with its 4,000 specimens, reflected the old-fashioned view that quantity was paramount, the new display clearly reflects the more contemporary stance that "more is less." Only 500 pieces make up the present exhibit, but these represent the cream of Field Museum's entire gem collection. Each gem or artifact is truly one of a kind.

Jewelry items are few, but these are uniformly excellent. While the former exhibit had a large number of jewelry pieces, often with rare-metal settings of exceptional workmanship, the stones themselves were seldom first-rate.

The old exhibit also featured a plethora of lapidary art: vases, boxes, candlesticks, letter-openers, figurines, even dishes, fashioned from rocks and minerals—an unseemly variety in an exhibit that was ostensibly of *gems*. A modest section of the new exhibit features a small number of such pieces.

The old exhibit also had many examples of gem-bearing rocks, and the gems contained in them were run-of-the-mill. Nor was their educative value great. The new hall features only a sampling of gem-bearing rocks, and these have been selected from many thousands of specimens for their particular interest.

The new Gem Hall owes much of its drama and splendor to the state-of-the-art lighting—in its entirety an engineering marvel. The lighting arrangement accomplishes that most difficult feat: providing exquisite illumination for the 500 stars of the performance without drawing attention to itself. At the time of the hall's last renovation—nearly half a century ago—fluorescent tubes were the *dernier cri*. Such lights became popular because they threw off little heat and they lasted longer than the incandescent bulbs of that time. But they also had a serious shortcoming: fluorescent light is spectrally poor—it lacks the full range of color that is present in "white" daylight. The daylight that is visible to the human eye is really a blend of many colors—a fact easily demonstrated by viewing sunlight through a glass prism. This may be observed in nature when sunlight passes through a rain-filled sky, creating a rainbow. When light passes through a gemstone, the gem may also act as a prism. But since fluorescent lights contain fewer colors than daylight, the colors that are brought out in gems under fluorescence are often a poor representation of the stone's intrinsic colors. For example, aquamarine, which is commonly blue under natural light, may be mistaken for green beryl if seen under fluorescence. Star sapphires also suffer under fluorescence—the star is nowhere to be seen.

David M. Walsten is editor of the Bulletin; *Edward Olsen is curator of mineralogy at Field Museum.*

Portion of new Gem Hall, with tiger-eyes, jaspers, agates, and other stones. Photo by Ron Testa and Sonia Fonseca. N84166

The new lighting system utilizes high-intensity light bulbs whose color components are very close to those of sunlight. Under them, faceted stones sparkle as we expect them to and stones with stars reveal those stars in full brilliance. Such bulbs, however, generate a great deal of heat. This difficulty has been neatly dealt with by ducting off the heat into the Museum's ambient air system during the cooler seasons, resulting in savings of $600 to $1000 a year. This is one of many energy-saving devices that Field Museum has put into use in recent years.

All the gems are displayed in a single large, rather oval case, with an aisle through it that provides viewer-access to the case's inner side. The case might be regarded as an enormous necklace, whose setting is afire with 500 stunning jewels. At the base of this necklace is its famed centerpiece, the fist-sized Chalmers Topaz (5,890 carats), to dazzle if not to overwhelm visitors as they first enter the hall. The new Grainger Hall of Gems is a gem in itself. Visitors will concur that it should rank among the visual treasures of the museum world.

When the hall opens to the public on November 5 a portion of the new permanent exhibit will not yet be installed. This area will temporarily accommodate five spectacular gemstones on loan from the National Museum of Natural History (Smithsonian Institution). These are the 127-carat Portuguese Diamond, the Chalk Emerald (37.82 carats), the Eugenie Blue Diamond (31 carats), the Star of India Sapphire (329.7 carats), and a pair of diamond earrings that once belonged to France's Queen Marie Antoinette. These will be on view for six weeks until December 19, after which Field Museum gems will take their place. FM

Grainger Hall of Gems Preview for Members

November 3 and 4, 9:00 am to 5:00 pm

To gain admission to the exhibit, please present your membership card or preview announcement (mailed separately to Members) at the preview booth in Stanley Field Hall. A special pass to the gem exhibit will then be issued to you. Because of the small size of the Gem Hall and its limited capacity, Members are requested not to bring guests. Special arrangements for handicapped persons may be made by calling 922-9410, ext. 453.

Portion of new Gem Hall, with spodumenes (left) and kunzites. Photo by Ron Testa and Sonia Fonseca. N84170

THE NORTHWEST COAST COLLECTIONS AT THE COLUMBIAN EXPOSITION

The Field Museum's world-renowned collection of anthropological materials from the Pacific Northwest had its beginnings in the artifacts assembled for Chicago's 1893 World's Fair

by Douglas Cole

Early in 1891 Franz Boas, a young German anthropologist, accepted an assignment to work on the anthropological exhibits planned for the 1893 Chicago World's Fair, the exposition to be held in honor of the 400th anniversary of the discovery of America by Columbus. In charge of "Department M," somewhat mislabeled as the Department of Ethnology, was Frederic Ward Putnam, director of the Peabody Museum at Harvard. Putnam [who knew Boas from professional meetings] asked the young immigrant scientist to serve as assistant in charge of physical anthropology and to supervise a special display of Northwest Coast tribes. As part of his duties, Boas entered into correspondence with hundreds of schoolteachers, missionaries, and administrators to arrange the measurement of over 90,000 North American school children and 17,000 Indians. Simultaneously, he set in motion a scheme for a comprehensive Northwest Coast Indian exhibition that would focus on the Kwakiutl of Fort Rupert, a Vancouver Island village.

A trip west in the summer was largely consumed by ethnological work for the Bureau of Ethnology along the Columbia and Yakima rivers, but Boas also made arrangements for World's Fair collections with a number of coastal acquaintances and particularly with George Hunt, a Fort Rupert Kwakiutl. Upon his return east in September, the outlines of the fair display were firm.

The Fort Rupert Indians would be the "standard tribe," with additional collections from the Haida, Tsimshian, Nootka, and other neighboring tribes. The Kwakiutl were made the pivot of the display because, Boas wrote, they were central to the region's culture, which had its origin among these Fort Rupert tribes whose influence had been exerted over the other tribes on the coast. The evidence of this was in the borrowed Kwakiutl names given to all those ceremonies which played so important a part in the customs of their neighbors. Boas had arranged with Hunt for a collection of the necessary specimens to illustrate Kwakiutl life and culture and, moreover, had arranged that Hunt bring to Chicago a group of Kwakiutl "to show whatever is asked of them in relation to their customs and mode of life particularly the ceremonies connected with their secret religious societies." Hunt would bring a large house, canoes, the outfits of daily life, and all that was necessary for the performance of ceremonials.

For his collections Boas enlisted the assistance of experienced people he knew on the coast. James Deans, the old Hudson's Bay Company man from Victoria who had assisted Alphonse Pinart[1] in his shell-heap collecting in 1876 and had toured the Queen Charlottes[2] with James G. Swan[3] in 1883, and who was a frequent contributor of ethnological miscellanea to the *American Antiquarian* and other journals, he commissioned to make a Haida collection. Fillip Jacobsen,[4] who had stayed on the coast after bringing

This article is excerpted from chapter five, "Museums, Expositions, and Their Specimens," of the book Captured Heritage: The Scramble for Northwest Coast Artifacts, *by Douglas Cole,* *copyright © 1985 by Douglas Cole, and published 1985 by University of Washington Press, Seattle and London.*

1. *Alphonse Pinart was a wealthy Frenchman who collected antiquities and anthropological materials.*
2. *An island group on the coast of British Columbia.*
3. *A pioneer resident of Washington Territory.*
4. *A young Norwegian who had experience collecting ethnological materials on the Northwest Coast.*

Northwest Coast Indian houses at Chicago World's Fair, 1893. House at left is Haida; at center, Kwakiutl. Third totem pole from left is on permanent exhibit in Stanley Field Hall. Remainder are in the permanent exhibit Maritime Peoples of the Arctic and Northwest Coast. Courtesy American Museum of Natural History.

home the Hagenbeck[5] Bella Coolas, was to make a Bella Coola collection. Mrs. O. Morrison, native wife of Charles Morrison, the Fort Simpson trader so helpful to Swan, was to collect at Port Essington and on the Skeena. Swan himself, now seventy-three years old and already working for Washington State's exhibit, was to collect from Cape Flattery. Myron Eells, a Congregational minister also engaged in the state display, was charged with gathering a representative collection of the Puget Sound Salish, while others were asked to collect at Shoalwater Bay and in the British Columbia interior.

The Boas team began their work in earnest in the spring of 1892. Their collections began arriving in Chicago in the fall, stored in the acres of warehouses specially erected for the exposition. From Deans came three boxcarloads of Haida material. "The wide world will stand in amazement" was his confident assessment of the beauty of Haida art as revealed by his collection. Ceremonial and shamanistic material was included, along with an entire Skidegate house and its forty-two-foot pole. It was, he admitted, "a rather poor specimen of a Haida house but then, as so few of the old houses were left & I could do no better." At least as unusual was a set of models which accurately reconstructed Skidegate village at its 1864 prime: twenty-five houses and poles, ten memorial columns, six grave posts, and two burial houses.

Jacobsen sent a Bella Coola collection costing $554 and particularly strong in clan and secret society material and in stone implements. From Mrs. Morrison came almost $500 worth of Nass and Skeena pieces, some of which, including two large poles, had been bought through merchant Robert Cunningham. Swan sent a small collection of sixty-five articles from Neah Bay, and Eells a good sampling of everyday articles from Puget Sound, as well as a collection of models illustrating every canoe type to be found between the Columbia River and Cape Flattery.

Last to arrive—delayed by storms at Fort Rupert and Alert Bay—was Hunt's collection. It was easily the largest: in addition to a whole house, it had some 365 pieces heavily emphasizing the winter ceremonials. Hamatsa, Grizzly Bear, Nutlamatla—virtually all

5. Carl Hagenbeck was best known as a trainer and exhibitor of wild animals; he was also an impressario who produced tours of "live" ethnic exhibits featuring small groups of people from exotic regions.

Kwakiutl (and some Bella Coola) secret societies—were represented.

Boas felt that his collaborators' efforts had resulted in the most systematic collection ever presented. Putnam judged the collections as "the most complete and important ever brought together from this, ethnologically, most interesting region." The assessments were exaggerated, but qualifiedly true. On the other hand, items were frequently poorly labeled since Boas had put aside his usual concern with stories and explanations.

To this collection was added the loaned Tlingit collection of Edward E. Ayer, a Chicagoan who had made his fortune supplying railway ties, first to the Northwestern, then to the Union Pacific roads.[6] "A natural born collector," his accumulation of ethnological artifacts became his chief recreation and delight. He had begun as a young man on a trip to California and continued while on army service in Arizona and New Mexico. Once in business, he collected as he travelled across the Plains, realizing that native life would soon be a thing of the past. With his wealth he bought everything he could lay his hands on, almost entirely from Indian traders in all parts of North America. His Northwest Coast collection came largely from an 1887 Alaska trip on the *Ancona*, which called at every cannery. At each stop he bought what he could, "and I had good luck, for I had two cabins full of Indian stuff." As usual it came indirectly: "I very rarely purchased relics through chiefs, though; mostly through dealers." Carl Spuhn, the Northwest Trading Company's agent at Killisnoo, was on board the ship and, observing Ayer's purchases, told him that "up in our loft we have any quantity of these things, and you can have all you want." At Killisnoo he "got all that three or four men could carry." Spuhn would take nothing for it. Ayer later reflected that the loft collection "would be worth several thousand dollars now. He was a very fine chap." Before taking it to the World's Fair, Ayer had displayed the collection at his Lake Geneva, Wisconsin, summer home—in a converted bowling alley. The poles were piled up against the barn.

The Northwest Coast exhibit, along with hundreds of others brought to Chicago by Putnam's assistants, by private collectors, by states and foreign governments, was intended for installation in the gigantic Manufacturers and Liberal Arts Building. The clamor of numerous exhibitors for additional space, however, pushed Department M out of that centrally located building and into a special one, belatedly begun for Putnam's department and a Liberal Arts spillover. Inevitably, construction was delayed and the Anthropological Building was finished a full month after the opening of Chicago's Great White City. Despite efficient installation by department staff, the exhibits were open to the public only on July 4, nine weeks late. Even then visitors had difficulty finding the building.

The Anthropological Building, shoved into the neglected and badly treated southeast corner of the grounds, inaccessible and distant from the central buildings, and hemmed in by the lake, the dairy barns, powerhouse, and train lines—"by what might be called the kitchen and back yard of the exhibition"—was "likely to be overlooked by nine out of every ten visitors." A plain and unpretentious structure whose only asset was that it contained the necessary space, "the Anthropological Building is the furthest in the rear, the most forlorn in its exterior and interior, and preeminently the one with the most promise of being a failure." The sorrowful fact was that Putnam had been squeezed out—" buffeted about by more worldly and

6. Edward Ayer was president of Field Museum 1893 to 1899. For more on Ayer, see "Books, Business, and Buckskin," by E. Leland Webber, in the July/August 1984 Field Museum Bulletin, *pp. 5-10, 19-25.*

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CAPTURED HERITAGE

The Scramble for Northwest Coast Artifacts

by Douglas Cole

Published by University of Washington Press

390 pages

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"Captured Heritage will, in my opinion, appeal to all those with a general... interest in the Pacific Northwest as well as to those with a more special interest in history and anthropology. It is extremely well written and I truly was unable to put it down once I had started reading it."—James W. VanStone, curator of North American archaeology and ethnology at Field Museum.

self-assertive chiefs of departments" and disliked by Director Harlow N. Higinbotham.[7]

The department's outdoor exhibits were not hampered by building problems and were ready for the opening. Putnam had arranged reproductions of Yucatan ruins in front of the building and the portal from Labna and the Serpent House of Uxmal shared pride of place with a Southwest cliff dwelling replicated to natural size. On the ethnic grounds north of the building, along the shores of South Pond, were the habitations of the native groups, most particularly two Northwest Coast houses occupied by the Kwakiutl.

Reminiscent of the unfulfilled ambition of Swan and Baird for the 1876 Philadelphia exhibition, and following a direct precedent established at Paris in 1889, the Chicago exhibition would display native groups living in their own habitations and demonstrating their crafts, customs, and ceremonies. The thrust of the Columbian Exposition was to honor America's pioneers and to celebrate the accomplishments of four hundred years of American progress. Putnam's aim was even more retrospective: to show the inhabitants of pre-Columbian America. The government's office of Indian Affairs would exhibit civilization's work upon the American aborigines in model schools.

Boas arranged for Hunt to bring as many as fourteen adults (of which four should be married couples). The consent of the Canadian Indian Affairs department was secured and early in April 1893, fifteen adults and two children, led by George Hunt and escorted by James Deans, arrived in Chicago. William Hunt and his Koskimo wife, the only longhead of the party, were with the group. They were all housed temporarily in three small rooms in the stock pavilion, with mattresses and bed-clothing, six chairs, and two stoves being requisitioned for their comfort until they moved into the traditional beam-and-plank houses on the ethnological grounds. The construction of these, threatened by delays in the confusion of the last days before the fair's opening, was completed when Boas himself procured some missing timbers.

The Haida house, standing behind its immense pole, was small but impressive. The Kwakiutl house, formerly belonging to the Nakumgilisala of Nuwitti, was typically painted with a Thunderbird over the door and moon crests to each side. Arranged nearby were canoes, poles, and posts, most gathered by Boas's collectors, but several loaned by Ayer. The beach in front of the houses was eventually graded for easy canoe access. The actual occupation of the houses in May became the occasion for "the first of a series of ceremonials" since the Indians "never enter any home without elaborate ceremonies." A requisition went in on the next to the last day before the fair's opening for 39 yards of blue and scarlet flannel, 232-dozen pearl buttons, and other material needed at once to complete the outfit of the Fort Rupert Indians.

Despite the effort at systematic and authentic representation, the expeditions to Mexico and South America, and Boas's indefatigable anthropometrics and Northwest Coast work, the fair's anthropology exhibit was something of a failure. It was significant enough in its own right (though probably not matching the impressive Paris display of four years earlier), but when pushed to the remote edge of Jackson Park, literally at the end of the railway track, it became marginal to the exposition. Moreover, the sheer size and diversity of the fair overwhelmed the department.

Chicago's was by far the largest world exposition yet undertaken, with more exhibits in an incomparably larger area than Paris and well over the Philadelphia Centennial's area, number of exhibitions, and attendance.[8] Even the Kwakiutl made very little impression. It was not merely that they shared the ethnological grounds with an Apache craftsman and a Navaho family in their hogan, with four families of Penobscots in their birch bark wigwams, with representatives of the Six Nations in a traditional Iroquois bark house, and with British Guianese Arawaks in a thatched hut; the exoticism of these official exhibitions simply could not match the enormous color and panache of the ethnological exhibition "run riot" on the Midway Plaisance. This mile-long "open mart and caravansary of nations" was a free-wheeling entrepreneurial sideshow which almost overshadowed the exposition itself. Nominally the Midway was under the administration of Putnam's department of ethnology—appropriate enough, wrote the fair's official historian, for here the ethnologist could study the actual daily life and customs of "peoples of every clime and continent, typical representatives of all the varieties and races of mankind." Crowded under G. W. G. Ferris's 250-foot-high wheel were 280 Egyptians and Sudanese in a Cairo street, 147 Indonesians in a Javanese village, 58 Eskimos from Labrador, a party of bare-breasted Dahomans in a West African setting, Malays, Samoans, Fijians, Japanese, Chinese, as well as an Irish village with both Donegal and Blarney castles, and a reconstructed old Vienna street. The official ethnological exhibition with its handful of Kwakiutl, Navaho, and Arawak was reduced to insignificance. Only the most unusual or bloodcurdling Kwakiutl demonstrations could match the erotic Egyptian dancers and other *succès de scandale* of the Midway.

On May 24 the queen's birthday was officially celebrated at the Canadian Building with an afternoon

7. *Harlow N. Higinbotham was president of Field Museum 1899-1909.*

8. *The area of the Chicago Exposition grounds was 633 acres, compared to 160 acres for the Paris Exposition of 1889.*

Totem exhibit (including Mesoamerican) in early years of Field Museum, shortly after the Museum was formed out of the collections at the Columbian Exhibition. N1187

reception for all British subjects. At the same time a Kwakiutl canoe pushed off from the South Pond beach and, propelled by a dozen paddles, came round the canal and entered the Grand Basin through the classical peristyle. As it passed under the arch, the entire boatload stood up and "howled and danced to the jingle of the tamborine." The noise quickly drew several thousand spectators to the colonnaded waters, there to puzzle over "why the British flag should be floating over such a fierce, savage-looking lot."[9]

A far more horrible scene reportedly transpired one sweltering mid-August evening. In a gruesome enactment of what a journalist called the "Sun Dance," George Hunt cut two pairs of gashes through the skin of the backs of two Indians. While the two stood motionless, Hunt raised the flesh and passed heavy twine beneath the loose strips and tied the ends firmly together. The low monotone chant and the dull drum beats of the other Indians now became wilder and more violent as the two Indians, rivulets of blood trickling down from the cuts in their backs, raced round the platform driven like steeds by two more natives who seemed to take a wild pleasure in the act. "Around and around they ran, leaping, twisting, and diving till it seemed to the horror-stricken spectators that each instant would see the flesh torn from their bodies." The other Indians became frenzied and then, with eyes like wild animals and faces like famished wolves, the two tore the ropes from their fleshy fastenings, each "snapping and snarling like a mad dog" at the other Indians on the platform. Hunt walked over to one and extended a bare arm which was fastened upon with teeth that met in the flesh. When finally released, a piece the size of a silver dollar was missing from his arm, but he merely smiled, showing no signs of pain. In the hour or more that had elapsed a large part of their audience of five thousand had left, "sickened by the horrible sight."[10]

The Rev. Alfred J. Hall learned of the atrocious performance from the lurid *Sunday Times* account. He had only just arrived in London from Alert Bay and what he read of the pagan behavior of his Kwakiutl flock outraged him. He protested to Ottawa and demanded the cancellation of the Kwakiutl's engagement if that were at all possible. Before leaving Alert Bay he had, he said, done all he could to persuade the Indians not to go to Chicago and he confessed to having had some influence so that those who went had been gathered almost wholly from other villages. At Chicago on his way to London, he had personally observed that the U.S. government was proudly exhibiting civilized bands from their industrial schools, while from Canada came "only

9. New York Times, *May 25, 1893, 2.*

10. *"A Brutal Exhibition,"* New York Times, *August 19, 1893, 5; "Horrible Scene at the Fair,"* The Sunday Times *(London), August 20, 1893, 3.*

Model of Kwakiutl village originally on view at Columbian Exposition. Shown here, shortly after, in the Field Museum (Jackson Park). N8076

this display of paganism, chosen by Dr. Boaz [sic] because the most degraded he could find in the Dominion."[11]

Lawrence Vankoughnet, the deputy superintendent general of Indian Affairs and the recipient of Hall's outraged letter, responded immediately. He asked the Canadian commissioner at Chicago to have such exhibitions stopped at the earliest possible moment. A. W. Vowell, Powell's successor in Victoria, was told to ascertain from Kwakiutl agent R. H. Pidcock if he had known of Hunt's object in asking the Indians to appear at the fair and, if so, what measure he had taken to frustrate the endeavor. Pidcock replied that he knew Hunt had been commissioned by Boas to make a collection of curios and to persuade about a dozen Indians to go to Chicago to illustrate their mode of life, but he had had no idea that Hunt contemplated any such dance as reported. He had discouraged any Indians who had asked his advice. He had been led to believe, he wrote, "that the party were in [the] charge of Dr Boaz or his agent and that Hunt was only employed as Interpreter, as I should not consider that he was at all a fit and proper person to have charge of a party of Indians." From Chicago J. S. Larke confirmed the event. Although "the barbarism I think was not as great as described," some of the cruel and revolting scenes as reported in the *Sunday Times* had occurred. So much repugnance had been created that exposition authorities promised to halt any repeat performance.

Like the Bella Coola's performance of an "Eagle Dance," it is difficult to determine how much of this "Sun Dance" was real and how much hokum. Boas described a similar dance, the *hawi'nalaL*, a few years later and, though he usually was careful to mention the special effects used to simulate bloody scenes, his account contains no mention of theatrical devices. Charles Nowell described a similar ceremony, which he called the "Warrior Dance," in which there was no fakery—it "hurted a little bit" when the flesh was pierced, but during the dance "I didn't hardly feel any pain at all." Larke's letter, too, seems testimony that the newspaper reports, though exaggerated, had a basis in fact. Another incident involving apparently vicious and bloody beatings turned out to be pure folly: the clubs were made of kelp and filled with red paint.

While the presence of fifteen Kwakiutl in Jackson Park for the better part of six months occasioned difficulties (there were, for example, some liquor problems), the group did not in other ways produce as much interest as Boas might have liked. Moreover, he found himself too busy with administrative work to advance greatly his own Kwakiutl studies. He was able, however, to teach Hunt to record linguistic texts in phonetic script, preliminary to the thousands of pages of myths, descriptions, and other texts that Hunt would send to New York in the following years.

In one respect the fair was a reunion. Capt. J. Adrian Jacobsen was at Hagenbeck's Arena on the Midway where he exhibited the unsold portion of the British Columbia collection which he and Fillip had made in 1885-86. George Hunt, Jacobsen's very useful assistant back in 1881-82, and his brother William and his wife were, of course, in Chicago. All three had intended to go with the Jacobsens to Germany eleven years before. Boas discovered that almost all the Kwakiutl material in Berlin had been bought from members of the Chicago troupe and that he could get full descriptions of the specimens for Bastian.[12] Jacobsen even claimed partial credit for the Kwakiutls' presence in Chicago: the favorable reports made by the returned Bella Coolas of their trip to Europe had helped Hunt in convincing his Kwakiutl friends to make the Chicago visit.

Jacobsen's collection, inappropriately displayed among Hagenbeck's trained animals, was only one of a number of Northwest Coast collections which supplemented the Boas-supervised material in Department M. In the Anthropology Building itself, not far from Boas's display, was a large collection gathered and exhibited by Captain Newton H. Chittenden, "the picturesque explorer and investigator" who held official appointment as a British Columbia special commissioner to the exposition. Next to Chittenden's artifacts were "collections of ethnological material from British Columbia and Baffin Land" exhibited by Mrs.

11. Letter from Rev. A. J. Hall to L. Vankoughnet, August 24, 1893.

12. Adolf Bastian was a German ethnologist who served as director of the Prussian Museum for Volkerkunde.

Marketplace for the Arts

Loop Facility Features Wares of Chicago Cultural Institutions

September 27 was opening day for Marketplace for the Arts, in the lobby at 150 N. Michigan Avenue. The new facility, open 10am through 6pm each weekday, is a fresh concept in marketing and promoting the wares and the activities of five major cultural institutions in Chicago: the Field Museum, the Chicago Historical Society, Chicago Symphony Orchestra, Lyric Opera, and the Museum of Contemporary Art.

Dolls in costumes of the 1920s and 30s are sold alongside limited-edition silk scarves, Hopi pottery, chocolates from Long Grove Confectionery, Alessi teakettles, and other distinctive items. The interior design of Marketplace for the Arts, created by A. Epstein and Sons, is an eclectic mix representing the structures that house the five institutions. Commonwealth Edison is sponsor of the new facility.

Franz Boas, material collected by Boas, perhaps largely in 1886, and not sold to Berlin or elsewhere. Not far away was Ayer's large North American collection, including a considerable selection of Tlingit basketry, and the Alaska collection of E. O. Stafford that had been gathered by A. P. Swineford while governor of the territory. In the physical anthropology section, located in the building's north gallery, were Boas's Vancouver Island skulls, systematically displayed in glass cases among other cranial examples.

Northwest Coast displays could be found elsewhere on the grounds. The British Columbia room of the Canadian Building, itself guarded at its main entrance by two Haida bear sculptures, contained "a handsome collection of curios" gathered by Indian agents under the supervision of A. W. Vowell. Superintendent Vowell had made the collection reluctantly, feeling that the $4,000 he understood Boas to be spending was enough to "carry out the object desired." The $500 advanced him by the Department of Indian Affairs could fetch "but little of interest" since "all the best things that were available are pretty well exhausted by the drains constantly made upon them by tourists and by the said agents of the World's Fair." Ottawa would hear of no such thing and, learning that the fair's collection would not be "exhaustive," insisted that every effort had to be made to see that the Indians and their manufactures were fairly represented. Vowell shipped material costing $495.40, mostly minor items like mats and spoons, but certainly enough to prove to British Columbia's own commissioner in Chicago that his province's aborigines were "of higher artistic development than any of the Indians to the east of the Rockies."[13]

Washington State's pavilion contained an Eells-Swan collection. In the U. S. Government Building, about a thousand yards from the Anthropology Building and much more central, Lt. G. T. Emmons displayed his huge collection of Alaskan Indian material, some 2,474 items supplemented by another 500 collected by Sheldon Jackson from Point Barrow Eskimos. Gathered since his 1888 sale of 1,350 pieces to the American Museum, the size, quality, and careful cataloguing of this collection established Emmons in first place as a Northwest Coast collector.

13. *Letter from A. W. Vowell to L. Vankoughnet, October 19, 1892.*

Members of Snake in the Grass Moving Theatre perform mythical themes of the Northwest Coast Indians on Saturday and Sunday, December 14 and 15, 2:00pm, in Stanley Field Hall. For additional information, see p. 5.

More comprehensive was the Smithsonian exhibition, jointly organized by the National Museum and the Bureau of Ethnology and based on Powell's linguistic map.

Among the language stocks selected to explore the relationship of language, ethnicity, and environment were the Koloschan (Tlingit), the Salishan (Bella Coola and Salish), the Skittigetan (Haida), and the Wakashan (Kwakiutl, Nootka, and Makah), each represented by costumed figures and wall cases of artifacts. Unlike Putnam's exhibit, the Smithsonian's was ready for the opening of the fair. It was, wrote a visiting French anthropologist, "extrêmement belle dans toutes ses parties."

The Columbian World's Fair closed in October and the process of winding down this largest of expositions began. The Kwakiutl troupe went back by Canadian Pacific rail. Putnam carried on a long argument with the railway company that they "be returned free like other exhibits, as they were exhibits in every sense of the term." Boas was glad to see them go. Nothing had ever caused him more worry and trouble; he swore "never again to play circus impressario." Deans, left behind at a dinner stop on the Prairies, wired ahead that the Indians be put off at the next stop, there to await him on the next day's train. Thereafter, according to Hunt, Deans "acted Bad to us. I did not like his way at all." The old Scotsman apparently lorded over his charges, not letting Hunt know what he was doing and telling everyone that Hunt was "one of his Indians." Indeed, Hunt felt that Deans "was wors than Indian." Putnam had arranged for $2,100 to be placed on deposit at the Bank of British North America in Victoria in Hunt's name. Hunt paid off "the boys," $150 to each, then returned to Fort Rupert to suffer from a serious measles epidemic that laid him low and, to his great sorrow, brought the death of his youngest son.

The collection in Chicago went various ways. Captain Chittenden packed up his "Collection of Relics and Antiquities" for shipment to the California Mid-Winter Exposition. The explorer and guide had given it to the Province of British Columbia in 1891, but took it on the exhibition circuit (he had already been to London for the Colonial and Imperial Exposition and to Antwerp) before depositing it in Victoria in 1894 after the close of the California fair. The Washington State collection returned to become part of a state museum in Seattle. The Canadian Department of Indian Affairs intended to sell its collection, but, finding that Indian curios were a glut on the market, decided to send it back to Ottawa where it might form the nucleus of a museum at the department offices. Eventually it ended up at the Geological Survey's museum.

Department M's collections were kept in Chicago. Partly as a result of Putnam's prodding, the leaders of the fair and the city decided to make exhibits from the exposition the basis of a permanent museum on the grounds. The collection of Hunt, Morrison, F. Jacobsen, et al. were moved to the Palace of Fine Arts, the building chosen to house the new Columbian Museum. To those collections were added, by gift, the Ayer collection, and, by purchase, Hagenbeck's Jacobsen collection, the Stafford-Swineford collection, and, at least provisionally, Boas's skull and skeleton collection.

Boas intended to stay with the collections. He expected to be placed in charge of the anthropological department of the new museum. That was certainly Putnam's recommendation. As he wrote to Ayer, the moving force behind the new museum, "Dr. Boas is the only person besides myself who is qualified to take charge of the anthropological material" and the only one left in Chicago who could bring order from the chaos of stacked boxes at the former Fine Arts Building. Putnam wanted very much that Boas be kept so that the "vast amount of exceptionally important and valuable material I have brought together should be placed in the proper charge of one who not only knows all about it, but who is the best man the museum can get to take charge of it."

It did not happen so. Putnam, never popular with the dominant forces of the exposition's administration and no more so with their successors in the Columbian Museum, found his influence thin and his advice ignored. Boas was kept on temporarily, but when the trustees found they could secure W. H. Holmes of the Bureau of Ethnology as curator, they hired him. Boas properly felt himself the victim of an "unsurpassed insult" and departed Chicago on April 15, as soon as his installations were in place.

He had long left his position at Clark University, part of a general revolt of the faculty against President G. Stanley Hall. Virtually all the others had been snapped up by the University of Chicago's W. R. Harper, but Boas had been passed over. The increasing demands of Putnam's department at the fair had turned his assistantship into full-time work and seemed to promise permanency at the successor museum. Now that had suddenly disappeared. He was too proud to accept an inferior position and his professional standing demanded that he should not. He was again unemployed and dependent upon contract work.

In the meanwhile he would spend the summer in Germany, then travel again to British Columbia to work toward the completion of the British Association's Northwest Tribes Committee research that had been left in abeyance because of his duties for Chicago. He could combine this with special assignments from Putnam for the American Museum and from Otis T. Mason for the U.S. National Museum. Both wanted to have Northwest Coast figure groups for their displays and no one was better qualified to supervise their construction than Boas. FM

Field Museum Founders' Council Marks Second Anniversary

It is commonplace to think of a museum's growth in terms of *increment*—the increase in size and scope of the collections, in particular. But we experience growth in additional ways—types of growth that are responses to the constantly evolving cultural climate in which we live.

This is especially true in the present age, when it is neither accurate nor fashionable to view museums as exotic showcases. Within the most recent half of Field Museum's history, a kind of symbiotic relationship between the Museum and its community has become increasingly apparent: The Volunteer Program had its inception during the years of World War II. Members of the community who had an interest in participating as part-time volunteers filled a critical need when the war effort drew away staff members. The arrangement was so successful that it was perpetuated in peacetime. In the sixties the Women's Board was formed by local women who also felt a need to contribute in a very personal way to the promotion and support of Field Museum.

In 1983 the community's involvement with Field Museum was further broadened when Trustee Bowen Blair and other Museum friends created the Founders' Council, enabling the Museum's constituency to enter into an equally important relationship with it. Mr. Blair, a prime mover in organizing the Council, had been a Trustee since 1961 (he was elected Life Trustee in 1984), continuing a family commitment to the Museum that dated back for several decades. His father, William McCormick Blair, had served as Trustee or Life Trustee for 42 years. In addition to Bowen Blair's service on the Board, he and Mrs. Blair were Museum Benefactors, as was his father before him. Fittingly, Bowen Blair served as the Council's first chairman. Thomas J. Eyerman, named a Trustee in 1984, succeeded Blair as Council chairman, inaugurating during his tenure a broad range of innovative participatory programs for Council members.

The new Council gave Museum Members the opportunity to help provide leadership in advancing the natural sciences through collections, research, exhibits, and teaching. Like the Museum's founding fathers, they were able to contribute directly to a greater understanding of the world's cultural and physical environment.

Membership in the Founders' Council became available to individuals or couples who provided an annual gift of $1,500, a single or accumulated gift of $25,000 or more, or a deferred gift of $50,000 or more. Corporations, businesses, or foundations qualified through an annual gift of $5,000 or a single or accumulated gift of $50,000.

The stated purposes of the Council, now entering its third year under the chairmanship of Trustee Henry T. Chandler, are to enhance public understanding and support of the Museum's programs, to stimulate public participation in Museum affairs, to establish an exemplary pattern of giving to the Museum, and to discuss the plans, problems, and objectives of the Museum. Membership in the Council now stands at near 300, including 40 corporations, companies, and foundations. Six honorary members complete the present membership list.

In special recognition of the continuing role of founders in the Museum's future, the Founders' Room was created out of the offices of former Field Museum President Stanley Field. The attractive new facility was made possible through the generosity of Council members Dr. and Mrs. Edwin DeCosta and the Walter E. Heller Foundation.

Notable activities since the Council's founding have included dinners and luncheons featuring distinguished scientists as guests, highlighted by lectures on their research activities; natural history tours to Upper Michigan (botany and geology) and Texas (ornithology); and a special award reception for world-renowned Stephen Jay Gould, recipient of the Council's Award of Merit. The award, which included a cash prize of $1,000, was in recognition of Dr. Gould's contributions to science and for his advancement of scientific literacy.

The Council's most recent event was a September 28 black-tie dinner and symposium, "Field Museum: Ambassador to the World," at which His Excellency Fernando Belaunde Terry, past president of Peru, and Mrs. Belaunde were honored. The theme of the evening's program was Field Museum's research in Peru. Participating in the symposium were Museum curators Michael O. Dillon (Botany), Robert A. Feldman (Anthropology), and John W. Fitzpatrick (Birds). The Belaundes were made honorary members of the Council (joining in that special category the Grand Duke and Duchess of Luxembourg, Stephen Jay Gould, and paleoanthropologist Donald C. Johanson). The Mid-America Committee co-hosted the evening affair. FM

YEAR-END GIVING

by Clifford Buzard
Planned Giving Officer

Thanksgiving Day, Hanukkah, and Christmas Day crowd themselves into less than a month of days and create a holiday spirit unmatched by any other season of the year. It is a season of joy, thanksgiving, giving, and sharing. The annual ritual of newspaper advertisements warning, "(number) Days Left for Shopping," creates a frenetic countdown as people from all walks of life plan their gifts to loved ones, friends, and favorite charities.

Another countdown takes place at the same time, a countdown that forces virtually everyone to get organized and plan. This is the year-end countdown, to midnight December 31, after which income, deductions, profits and losses for the year must be toted to determine that Tax Man's due.

For more than a year, Field Museum has encountered a countdown of its own, looking to its Centennial Year 1993. To prepare the Museum for the people of the Museum's second century, many visitor areas, including older exhibits, are being remodeled and even reconstructed. A new Gem Hall — to be named after a Museum friend and major donor — is opening in this month of November.

Other halls on each of the three floors of exhibit space are temporarily closed, as they, too, are being remounted, using modern techniques of lighting and exhibition, and incorporating new scientific knowledge. For donors wishing to make a significantly large gift, there are various visitor areas and portions of these halls, as well as the halls themselves, that can be named for or by the donor.

The person who enjoys the Holidays is the person who planned ahead and was not caught in the last-minute rush in either shopping or tax-planning.

The astute person enjoys the best of two worlds: as he plans his charitable giving to take the greatest advantage allowed by tax regulations, he also derives pleasure and satisfaction through his giving during this season. Year-end giving has this double advantage.

The manner in which the gift is given and the type of gift can be extremely important to the person who plans ahead. Thus, "year-end giving," so called, does take on a variety of forms. Some of these forms follow:

Gifts of Cash

It has been said that there are only two kinds of gifts, "planned," and "unplanned," and gifts of cash are usually thought of as impulse, or unplanned, gifts. However, the donor who wishes to derive the most satisfaction from his giving, will take as much time in thoughtful consideration concerning a cash gift as he would if involved in the most complicated type of gift of property other than cash.

Cash giving, nevertheless, is the most popular and simplest form of giving. For the person who itemizes the federal tax return, cash gifts up to 50 percent of one's adjusted gross income may be deducted in any given year.

For those who do not itemize deductions, but pay income tax through the "short form," 1985 may be the best year ever to give a substantial cash gift. Last year's allowable deduction for "non-itemizers" was only $75. For 1985, for the first time, one-half of the "non-itemizer's" gift may be deducted, up to 50 percent of adjusted gross income. Tax proposals currently pending would eliminate the deduction for "non-itemizers" completely.

Gifts of Securities

A popular form of giving over the years on the part of many friends of the Museum has been gifts of stock and other securities. Under the proper circumstances, giving of securities is less costly than giving the equivalent amount in cash. A person's own situation will determine whether this applies, and, before any such gift is given, it is wise to check with a tax adviser or attorney. Essentially, there are three ways in which to give securities:

1. Giving stock that has increased in value. When selling a stock that has increased in value, there is a capital gains tax to pay, even if the proceeds are given to the Museum. However, if the appreciated stock certificate itself is given to the Museum, a person can take a charitable deduction for the total value, including the appreciation, without realizing any capital gains tax liability.

2. "The Bargain Sale," giving only the appreciation: On occasion a donor wishes to give only the gains reflected in an appreciated security. He can do this by selling the stock to the Museum at his original cost. He

is, in effect, giving away the capital gain, while he preserves his original worth. While this is a gift of capital gains, the donor in such a circumstance is liable for a portion of capital gains tax, and should be well advised by his attorney or tax accountant.

3. If a donor has a "poor performer" (a stock that has gone down in value), he can eliminate it from his portfolio and make a gift to the Museum at the same time. This is the only circumstance where the donor would actually sell the security and give the proceeds to the Museum. In that way, the donor realizes a charitable deduction, but also can declare the loss as a deduction.

Giving appreciated stock—giving the certificates themselves—can be done in two ways. One, the donor can instruct his brokerage firm to have the shares transferred into the name of Field Museum of Natural History, and have the firm mail the certificate to the Museum. Upon receipt of the certificate, the Museum will issue a receipt. Transferring stock into another name can take several weeks; if the donor is trying to meet the December 31 deadline for tax purposes, there is a quicker method of giving the certificates:

The donor should send the certificate (unendorsed) by *Registered Mail* to the Development Office of Field Museum. At the same time, but *in a separate envelope,* the donor should send to the Museum an assignment form (or "stock power") that has been filled out and signed in the presence of a broker or national bank officer (who will stamp it "signature guaranteed"). Upon receipt of both, the Development Office will send a receipt to the donor.

Stocks, bonds, mutual funds, money market funds, certificates of deposit—all offer several alternatives for giving. In general, the donor will want to give only those securities that he has owned for the legally required long-term holding period.

Gifts of Real Estate

The varied types of real estate—homes, farms, condominiums, interests in buildings, undeveloped property, or a summer cottage—make welcome gifts to the Museum. In many cases, the same benefits accrue to the donor as in the giving of securities. Under a "life estate" agreement, a person may give the very home he lives in, take an income tax deduction for a portion of the home's fair market value, yet, live in the home for life.

Gifts of Life Insurance

While life insurance policies do not have to go through the probate process, they are counted in a decedent's gross estate for federal estate tax purposes. For this reason, some persons find it advantageous to give the

How Things Change

Do you hold the same opinions today that you held 10 years ago? Do you have greater income now than when you first started work? As a result, are you more secure financially, or in other ways?

Times change, and, in many ways, most of us change, too. Shouldn't your will reflect the changes in your life, which can affect your loved ones and allow you to provide better for them?

Send for the complimentary booklet offered below, and learn more about how your will can change to work for you.

---------- CLIP AND MAIL TODAY ----------

To: Clifford Buzard
Planned Giving Officer
Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, Illinois 60605

☐ Please send me a complimentary copy of "How to Protect Your Rights with a Will."

Name _____
(please print)

Address _____

City _____ State _____ Zip _____

Phone: (home) _____ (office) _____

Best time to call: (day) _____ (hour) _____

Museum life insurance policies. There are immediate advantages as well:

By giving a policy irrevocably to the Museum, the donor may take an immediate income tax deduction for the cash surrender value of the policy. Even if it is not a paid-up policy, this can be done; the annual premiums the donor continues to pay create charitable contribution deductions each year.

A person may change the beneficiary of a policy to Field Museum. If he does this irrevocably, he, too, can take advantage of the tax deduction.

Field Museum urges Members also to consider naming the Museum as beneficiary—or even, contingent beneficiary—not only of life insurance policies, but also of pension plans and individual retirement accounts (IRAs), tax-sheltered annuities, and certificates of deposit, even U.S. savings bonds.

Giving Other Personal Property

Forms of personal property other than cash, securities, and life insurance, fall in a huge category of "gifts-in-kind." Any asset can be considered "giveable," and some of these items, not usually thought of in terms of charitable gifts, are greatly appreciated by the Museum. Examples of property that may be given to the Museum are: automobiles, trucks, boats, art, jewelry, furniture, antiques, artifacts, collections of stamps, coins, or gems, and books.

Making a "gift-in-kind" can be complicated, due to IRS regulations. Generally, the fair market value can be taken as a tax deduction. However, the onus lies with the donor to "prove up" the value satisfactorily with the government agency. The IRS regulations call for filing a special form for such gifts valued at $5,000 or more. Furthermore, the tax law makes a distinction between gifts "to" an institution and "for the use of" an institution. It is, therefore, wise to consult an attorney or tax adviser, when considering making a "gift-in-kind."

Receiving Income From One's Gift

Museum Members are discovering the advantages to them of giving large amounts through trust agreements. Through such agreements, income generated by the gift is obtained by the donor for life.

Basically, these agreements are in the form of one of three types of trusts: the Pooled Income Fund, and the charitable remainder annuity and charitable remainder unitrust.

These forms of life income trusts have several benefits and advantages:

☞ A person can make a substantial and self-satisfying gift during lifetime, yet retain the security of a life income from that gift.

☞ By including long-term, highly appreciated stock into the trust, capital gains are unlocked for possible greater income.

☞ As with any outright gift of securities, capital gains are not recognized, and, therefore, no capital gains tax is accrued.

☞ The donor receives an immediate income tax deduction on a portion of the entire amount of the gift. This portion is governed by IRS actuarial tables, and the deductible factor depends on the donor's age and the yield of the trust.

☞ Charitable life income trusts provide professional money and investment management. This is often the greatest advantage of such trusts established by will: it protects the principal from the spendthrift heir, and it can protect the heir from cunning relatives or unscrupulous salesmen.

Both the charitable remainder annuity trust and charitable remainder unitrust are trusts set up for an individual donor. The Pooled Income Fund is a trust established for the benefit of several donors. The Pooled Income Fund has the same benefits and advantages as the individual charitable life income trusts; only the income interest (amount of the gift) is smaller. Generally, the Pooled Income Fund accepts participation with a minimum gift of $10,000; for the donor's best advantage, individual life income trusts should be established with a minimum of $100,000. Any Member interested in these vehicles of so-called "deferred" giving, is welcome to call the Planned Giving Office (312) 322-8858 —for detailed information.

Setting aside all the income tax deductions possible, all the lifetime incomes possible, and all the monetary advantages and benefits of giving to Field Museum, the greatest benefit of a gift is still there. That benefit is the donor's great satisfaction derived from giving. This satisfaction is all the more enhanced when the donor realizes the importance of the gift to the charitable institution. The donor to Field Museum of Natural History knows that he is helping one of the world's great museums; he is helping an educational and research institution of national and international renown. During this decade's countdown to the Museum Centennial of 1993, the donor's greatest satisfaction will come from the knowledge that he has helped assure the Museum for the people of its second century. FM

Viewing Halley's Comet

by Paul P. Sipiera *and* Edward Olsen

Halley's Comet is now just weeks away. As described in the June *Bulletin* ("The Comet Cometh," pp. 18-25), by early December we will have our first chance to see it. As noted there, the visual sighting of this famous comet is, unfortunately, going to be the worst in a thousand years, but the 1985-86 passage will be studied in great detail by space probes from the USSR, Japan, and the European Space Agency (ESA). The ESA probe, *Giotto*, will pass within 400 miles of the comet's nucleus after penetrating the gaseous, dusty, bright envelope, or *coma*, surrounding the nucleus.

The recent successful passage of a U.S. satellite, *ICE*, through the dense part of another comet, Giacobini-Zinner, suggests that the much-feared damage a probe could suffer by the outpouring of high-speed dust particles from the comet's nucleus, may not be so great after all. If this is true of Comet Halley, then *Giotto* might send back an extraordinary amount of information, undiminished by dust impact.

Viewing is going to be best in the Southern Hemisphere because the comet will pass higher in the sky there when it is brightest. Unfortunely for viewers in that hemisphere, Halley will then be positioned against the Milky Way, diminishing contrast. Bright moonlight at this time will also tend to wash out detail of the comet's tail. In the Northern Hemisphere the comet will appear relatively low in the sky, which means you have to be out in open country, away from structures and trees, and definitely away from lights.

To view the comet it is desirable to have a fairly strong pair of wide-field binoculars. Such binoculars are 7x50, 7x35, 8x40—wide field. A small telescope with a wide field is also fine; however, many small telescopes have high magnification and narrow fields of view. This means that it is difficult to locate the comet because you see only a tiny bit of the sky at a time. If you are lucky enough to lock onto it with such a telescope, the motion of the earth will cause the comet to move rapidly out of view unless your telescope is driven by a clockwork mechanism to synchronize it with the earth's motion. Unless you have such a telescope and considerable experience, photographing the comet is difficult.

In the accompanying table are summarized the best viewing times (Central Standard Time) for Chicago-area viewers.

Paul P. Sipiera is a research associate in the Department of Geology; Edward Olsen is curator of mineralogy.

Comet Halley's Positions as Viewed from Chicago's Latitude

Date	Time	Angle above horizon	Direction	Brightness	Constellation
12/1/85	5:35pm	46°	ESE	Weak	Pisces
12/15/85	5:35pm	51°	SSW	Weak	Pisces
12/30/85	5:43pm	35°	SW	Brighter	Aquarius
1/4/86	6:00pm	29°	WSW	Brighter	Aquarius
1/15/86	6:00pm	16°	WSW	Brighter	Aquarius
1/30/86	Too close to the sun; lost in the glare				
3/5/86	5:15pm	4°	ESE	Bright	Capricorn
3/15/86	5:00am	6°	ESE	Bright	Sagittarius
3/30/86	4:35am	6°	SSE	Bright	Sagittarius
4/2/86	4:35am	5°	SSE	Bright	Scorpio
4/8/86	4:20am	At horizon	SSE	Brightest	Scorpio

To estimate the angle above the horizon you can hold your flattened hand palm sideways at arm's length. The angle it makes is approximately 7°. Thus, 5 hands edge to edge is about 35°. The brightness is given in relative terms, rather than in astronomical brightness units, which defy brief explanation. "Weak" means the comet will be about as bright as an average weak star. "Brightest" means it will be about as bright as a fairly bright star. It will never be as bright as such objects as Venus or the Moon. Constellation refers to the zodiac constellation in the background behind the comet's position.

TOURS FOR MEMBERS

The Precolumbian observatory at Chichen Itza, Yucatan

Yucatan Discovery Cruise

January 10-26, 1986

A team of specialists will take you through the incredible ruins of the Yucatan, built by the highly cultured Mayan peoples between the 3rd and 13th centuries A.D. Cruising aboard the Greek-staffed *Stella Solaris*, we will visit Playa Del Carmen, Uxmal, Tulum, the famed ceremonial city of Chichen Itza, and the newly excavated Coba. There will be plenty of swimming, snorkeling, and sunbathing in Xel-Ha, Akumal Beach, and Cozumel. In addition, we will visit the modern resort of Cancun, the island of Grand Cayman and Montego Bay.

Egypt

January 29-February 15, 1986

$3,715

Explore Egypt, the land of ancient mysteries. Journey from bustling Cairo, with its renowned Egyptian Museum, its mosques, minarets, and markets, into the ghostly silence of ruined cities, splendrous temples, and noble tombs. The 5,000-year-old Step Pyramid, the massive stone ruins of Karnak, and the Colossi of Memnon all beckon the curious and inspire respect for a culture as old as Western civilization itself. As you cruise the Nile, observe age-old scenes along the shore, for life in the fertile Nile Valley has changed but little. We encourage early enrollment, since spaces fill quickly for this breathtaking journey into the past.

Baja California

March 8-23, 1986

Less than 50 miles south of the U.S.-Mexico border begins a peaceful world of subtropical beauty—the Sea of Cortez (Gulf of California). Over 600 miles long, this gulf is a paradise for marine vertebrate and invertebrate life—and for those of us who enjoy its study. Field Museum members will have the opportunity to know this sea of wonders in a voyage that will all but complete the circumnavigation of the peninsula of Baja California.

Until 1973 road travel in Baja California required rugged vehicles and rugged souls. Even now less than 5 percent of the coast is accessible by road. And although for decades fishermen and scientists have found the region a treasure house of riches, it has escaped popular attention. In the 1970s world interest in whales grew. At the same time there was a dramatic increase in the numbers of California gray whales, and today each year from December through April, 15,000 gray whales visit Baja's Pacific lagoons to breed, give birth, and nurture their young.

It was our desire to organize a Field Museum tour to this area. All that was needed was a small, maneuverable, comfortable ship. We found it—the *Pacific Northwest Explorer*—and in January 1981 our first Field Museum circumnavigation from San Felipe to San Diego began. There were pelicans and hummingbirds, strange endemic plants, lovely scenery, and whales and dolphins beyond expectation. During this and the next two voyages we encountered not only many gray whales, but also fin, humpback, sei, and, the largest of all—blue whales. At San Benitos we walked among huge "hauled out" colonies of northern elephant seals. And we saw more than 130 different birds and 120 fish species.

Now is your chance to experience the solemnity and the life, the aridness and the wealth, the starkness and the beauty that is Baja California. Now is your chance to join Field Museum's 1986 tour to Baja California, to be led by Dr. Robert K. Johnson, curator of Fishes at Field Museum. Dr. Johnson is a highly experienced tour leader. This will be his fourth trip around Baja California. Special Expeditions, a division of Lindblad Travel, operators of the ship to be used, will provide several additional naturalists whose expertise will further enrich our experience. Our home for the voyage is the one-class, fully air-conditioned 143.5-foot MV

TOURS FOR MEMBERS

Pacific Northwest Explorer, built in 1980. Early expression of interest and reservations are advisable.
Land and cruise arrangements per person:

Lower deck double cabin	$3,250
Upper deck (U201-215)	$3,950
Main deck	$4,090
Upper & bridge deck name cabins	$4,280
Lower deck single cabins	$4,890

(Air transportation to and from San Diego not included in above prices)

The Art and Culture of Indonesia— A Voyage to the Islands of the Java Sea

March 21-April 8, 1986

Composed of thousands of islands forming a vast archipelago, Indonesia is an ancient land of gentle peoples, rich and varied cultural traditions, and tropical landscapes of unsurpassed beauty. With its panoply of religions, art forms, rituals, and dances found nowhere else in the world, Indonesia confronts the visitor with a fascinating past; its history, myth, and legend are often inseparable. On an itinerary which has been carefully planned to include well-known sites as well as remote, verdant isles, we will travel aboard the ship *Illiria* to destinations of immense beauty.

China's Great Wall Stanton Cook, courtesy the *Chicago Tribune*

The Great Silk Route of China

May 21-June 15, 1986

$4,550

Field Museum is offering an exciting new itinerary for The People's Republic of China, featuring some new areas of interest to the world traveller and to those who have visited China previously. Our flight from Chicago is direct to Tokyo then on to Beijing. After several days there, viewing such marvels as the Forbidden City and the 98-acre Tien An Men Square, we go on to Urumqi, Dunhuang, Lanzhou, Xian, Shanghai, and Guilin. Xian is of particular interest to archaeology buffs for here we find the vast life-size terra cotta army discovered as recently as 1974. We return to the U.S. via Hong Kong.

Alaska

July 2-16, 1986

$4,885

Visit Alaska in summer! Explore magnificent waterways and vast parklands abundant with many species of birds. At Sitka, a marine wildlife rafting trip gets you started on this spectacular ornithological tour. From Juneau, a trip on the Mendenhall River offers unusual wetland viewing. From Anchorage one easily reaches Potter Marsh Bird Refuge and the Eagle River. Denali National Park (formerly called McKinley National Park) and the Glacier Bay cruise are special highlights. We conclude our trip with three days on St. George Island. Few people have visited this island, which boasts spectacular birding. Early enrollment is suggested. $50 will secure your reservation.

Grand Canyon Adventures

Field Museum Tours is offering two trips to the Grand Canyon in 1986. The first, August 13-22, is a geology study trip hiking down the north rim of the canyon, rafting for four days along the bottom and hiking back up the south rim. The second, August 22-31, is a rafting trip along the entire 300-mile length of the canyon by two motorized rubber rafts. Dr. Matthew H. Nitecki, curator of fossil invertebrates leads both. A deposit of $50 per person will hold your space.

For further information or to be placed on our mailing list, call or write Dorothy Roder, Tours Manager, Field Museum, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605. Phone: 322-8862.

Field Museum of Natural History
Membership Department
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605-2499

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ELD MUSEUM OF NATURAL HISTORY BULLETIN

December 1985

1986 Calendar

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of Natural History
Bulletin

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Diorama Masterpieces: The 1986 calendar, featuring selections from Field Museum's famed lifelike exhibits

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African Waterhole (detail). This diorama, possibly Field Museum's best known, is in the African Mammals Hall and was completed in 1932. The Museum's largest diorama, it is 45 feet wide, 22 feet deep and 22 feet high. Six mammal species are represented: reticulated giraffe, eland, oryx, Grant's gazelle, and Grant's zebra, with a total of 23 animals. All were acquired by the Harold A. White-John Coats Abyssinian Expedition of 1929. Museum taxidermist C. J. Albrecht designed the diorama and staff artist Charles A. Corwin painted the background. The diorama was two years in preparation. Photo by Ron Testa.

African Waterhole. N77111

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I certify that the statements made by me above are correct and complete. *Jimmie W. Croft*, vice president for Finance and Museum Services.

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Marsh Birds of the Upper Nile (detail showing crowned crane), in Bird Habitats Hall. Photo by Ron Testa. N93624

January 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
DECEMBER 1985 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**FEBRUARY** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28		**1** NEW YEAR'S DAY Museum closed	**2**	**3** last quarter	**4**
5	**6**	**7**	**8**	**9**	**10** new moon	**11**
12	**13**	**14**	**15** Martin Luther King's Birthday	**16**	**17** first quarter	**18**
19	**20**	**21**	**22**	**23**	**24**	**25** full moon
26	**27**	**28**	**29**	**30**	**31**	

Cro-Magnon Cave Artist of 35,000-10,000 years ago, in Hall of Prehistoric People. Photo by Ron Testa. N76950

February 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**MARCH** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					**1** last quarter
2 Groundhog Day	**3**	**4**	**5**	**6**	**7**	**8** new moon
9	**10**	**11** Shrove Tuesday	**12** **LINCOLN'S BIRTHDAY** Ash Wednesday	**13**	**14** St. Valentine's Day	**15**
16 first quarter	**17** **PRESIDENT'S DAY**	**18**	**19**	**20** Chinese New Year	**21**	**22**
23	**24** full moon	**25**	**26**	**27**	**28**	

Mimulus moschatus. Spring Flowers, in Plants of the World Hall. Photo by Ron Testa. 165264

March 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	**APRIL** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30					**1**
2	**3** last quarter	**4**	**5**	**6**	**7**	**8**
9	**10** new moon	**11**	**12**	**13**	**14**	**15** Ides of March
16	**17** St. Patrick's Day	**18** first quarter	**19**	**20** *first day of spring*	**21**	**22**
23 Palm Sunday EASTER **30**	**24** **31**	**25** Purim full moon	**26**	**27**	**28** Good Friday	**29**

Late Ordovician Life, in Fossil Shells and Plants Hall. Photo by Ron Testa. N80820

April 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**MAY** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1** last quarter	**2**	**3**	**4**	**5**
6	**7**	**8**	**9** new moon	**10**	**11**	**12**
13	**14**	**15**	**16**	**17** first quarter	**18**	**19**
20	**21**	**22**	**23**	**24** PASSOVER full moon	**25**	**26**
27	**28**	**29**	**30**			

Asian Leopard, in Mammals of Asia Hall. Photo by Ron Testa. N93621

May 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
APRIL S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**JUNE** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30			**1**	**2** Field Museum opened 1921 (Grant Park)	**3**
4	**5**	**6**	**7**	**8** Ascension (Whitsuntide) *new moon*	**9**	**10**
11 Mother's Day	**12**	**13**	**14**	**15**	**16** *first quarter*	**17**
18 Pentecost	**19**	**20**	**21**	**22**	**23** *full moon*	**24**
25 Trinity Sunday	**26** **MEMORIAL DAY**	**27**	**28**	**29**	**30** *last quarter*	**31**

Contemporary Iroquois Kitchen, in Indians of Woodland and Prairie Hall. Photo by Ron Testa and Sonia Fonseca. NA74T

June 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	**2** Field Museum opened 1894 (Jackson Park)	**3**	**4**	**5**	**6**	**7** *new moon*
8	**9**	**10**	**11**	**12**	**13**	**14** Flag Day
15 Father's Day *first quarter*	**16**	**17**	**18**	**19**	**20**	**21** *first day of summer* *full moon*
22	**23**	**24**	**25**	**26**	**27**	**28** *last quarter*
29	**30**					

MAY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JULY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Coal Age Forest, in Hall of Dinosaurs. Photo by Ron Testa. NS400

July 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
JUNE S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**AUGUST** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**1**	**2**	**3**	**4** INDEPENDENCE DAY	**5**
6 new moon	**7**	**8**	**9**	**10**	**11**	**12**
13	**14** first quarter	**15**	**16**	**17**	**18**	**19**
20	**21** full moon	**22**	**23**	**24**	**25**	**26**
27	**28** last quarter	**29**	**30**	**31**		

Middle Cambrian Life, in Fossil Shells and Plants Hall. Photo by Ron Testa. NB0872

August 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**SEPTEMBER** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30				**1**	**2**
3	**4**	**5** new moon	**6**	**7**	**8**	**9**
10	**11**	**12** first quarter	**13**	**14**	**15**	**16**
17	**18**	**19** full moon	**20**	**21**	**22**	**23**
24 **31**	**25**	**26**	**27** last quarter	**28**	**29**	**30**

Kwakiutl House: Ceremonial Life, in Maritime Peoples of the Arctic and Northwest Coast Hall. Photo by Ron Testa. N108627

September 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 LABOR DAY	**2**	**3**	**4** new moon	**5**	**6**
7	**8**	**9**	**10**	**11** first quarter	**12**	**13**
14	**15**	**16** Field Museum founded 1893	**17**	**18** full moon	**19**	**20**
21	**22**	**23** *first day of fall*	**24**	**25** last quarter	**26**	**27**
28	**29**	**30**				

AUGUST

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

OCTOBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Mule Deer (Rocky Mountain Variety), in Mammals of America Hall. Photo by Ron Testa. NZ32T

October 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	**NOVEMBER** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30		**1**	**2**	**3** new moon	**4** ROSH HASHANA
5	**6**	**7**	**8**	**9**	**10** first quarter	**11**
12	**13** YOM KIPPUR Columbus Day	**14**	**15**	**16**	**17** full moon	**18**
19	**20**	**21**	**22**	**23**	**24** United Nations Day	**25** last quarter
26	**27**	**28**	**29**	**30**	**31** Halloween	

Rocky Mountain Goat, in Mammals of America Hall. Photo by Ron Testa. N093627

November 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	**DECEMBER** S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					**1**
2 *new moon*	**3**	**4** General Election Day	**5**	**6**	**7**	**8** *first quarter*
9	**10**	**11** Veteran's Day	**12**	**13**	**14**	**15**
16 *full moon*	**17**	**18**	**19**	**20**	**21**	**22**
23 / **30**	**24** *last quarter*	**25**	**26**	**27** **THANKSGIVING** (Museum closed)	**28**	**29**

Reef Fishes of Bahama Islands, in School Lunchroom. NZ15T

December 1986

Field Museum of Natural History

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 new moon	**2**	**3**	**4**	**5**	**6**
7	**8** first quarter	**9**	**10**	**11**	**12**	**13**
14	**15**	**16** full moon	**17**	**18**	**19**	**20**
21 first day of winter	**22**	**23**	**24** last quarter	**25** CHRISTMAS (Museum closed)	**26**	**27** HANUKKAH
28	**29**	**30** new moon	**31**			

NOVEMBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

JANUARY 1987

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Field Museum of Natural History
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